

# LOW COST HOUSING FOR LIG CASE STUDY.

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**Abstract :** "Low-Cost Housing" assumes the challenge is to find innovative ways to reduce the cost of building houses making it affordable for every family to own. It is very important to have a shelter of your own. This paper addresses the problem of Construction of low cost housing by using the low cost building materials increases the access to buildings by low income group peoples. Low cost housing can be achieved by use of efficient planning and project management, low cost materials, economical construction technologies and use of alternate construction methods available. We can reduce the construction cost by using eco friendly materials. Thus to adopt the alternative options available in construction industry as discussed in this paper.

## I. INTRODUCTION

India is the developing country having only 20% population of higher income group. The dream of owning a house particularly for low- income and middle-income families is becoming a difficult reality. Hence, it has become a necessity to adopt cost effective, innovative and environment-friendly housing technologies for the construction of houses and buildings for enabling the common people to construct houses at affordable cost.

There is huge misconception that low cost housing is suitable for only sub standard works and they are constructed by utilizing cheap building materials of low quality. The fact is that low cost housing is done by proper management of resources. Economy is also achieved by postponing finishing works or implementing them in phases.

Low Cost Housing is a new concept which deals with effective budgeting and techniques which help in reducing the cost construction through the use of locally available materials along with improved skills and technology without sacrificing the strength, performance and life of the structure.

### 1.1 OBJECTIVE OF REPORT:

To find the way of successive implementation of affordable housing projects .

1. To study the concept current scenario of affordable housing project.
2. To identify critical success factors necessary for successful implementation of affordable housing projects by conducting questionnaire survey among the experts.
3. Evaluate the identified factors using the Average Index Method and Relative Importance Index Method.
4. Preparation of proposal for affordable housing projects.

## II. LITERATURE REVIEW

The literature review introduces the background to housing in India, urbanisation and the gradual shaping of housing in Indian cities. Issues relating to home ownership have been a major concern among political leaders, town planners and the government over the years. Owning a house is considered a big issue in today's societies. As such, an exact measure of housing affordability is essential to ensure the need for shelter. The review is directed towards issues of sustainable housing development in urban India. For the purpose of this review data used has been obtained from government reports, various organisational reports, newspaper clippings, web pages, publications, journals and books.

**Jingchun Lin, 2011;** The development of 'Affordable housing' has become an urgent and important topic of discussion in China. Unlike in western countries where the social welfare system has been set up for many years and the public housing system also is mature, in most of Asian countries, the social welfare systems are still weak in relation to their large amount of low-income populations. The gap between rich and poor is considerable large, and is still increasing; many people with low-income could not afford their own houses since the minimum down-payment and the entry-requirement of real estate market are both increasingly high; the 'Affordable housing' is therefore very difficult to be developed appropriately under this circumstances [1].

**Anniz Fazli Ibrahim Bajunid, et., al., 2012;** "Low-Cost Housing" assumes the challenge is to find innovative ways to reduce the cost of building houses making it affordable for every family to own. This paper addresses the problem through a social standpoint by first reviewing this crisis by providing the complexities that leads to concentration of poor families, and then provide a theoretical alternative - the Affordable Mosaic Housing concept, a possible inventive solution. A methodology of testing this concept is then proposed by mirroring closely to the methods and results of Universiti Putra Malaysia's surveys on the perceptions and acceptance of the new Honeycomb houses and apartments[2].

**Abhijith V , et. al., 2013;** The primary objective of this paaper is to study the urban housing problem in India and provide a viable solution to overcome this. It tries to identify the main reasons for the inadequacy of low-cost housing units and why the government and private sector have failed to address this issue. The article analyses the business model of an NGO, "Habitat for Humanity India" to identify the different stakeholders and their roles and responsibilities. Based on the learning gained, the article tries to propose a scalable and sustainable model to alleviate this growing problem [3].

**Salem Y. Al Qudwa, 2013;** The term minimalism is used to describe a trend in design and architecture where the subject is reduced to its necessary elements. In terms of architecture and for the purposes of this thesis, the concept of minimalist architecture is described in the following way: To strip everything down to its essential quality and achieve simplicity, by sorting out highest priority architectural requirements are, and then to do the possibly least to achieve them. Other aspects of this trend are using basic and elemental geometric forms, raw materials, and the repetitions of structures which represent a sense of order and essential quality [4].

**S. S. Shinde, et., al., 2013;** Affordable housing projects are characterized by an increasing demand mainly due to urbanization. The selection of building materials should meet the needs of local conditions to improve quality of life for the most needed ones by building new structures and/or by improving existing structures. This dissertation is a study on the use of building materials and engineering design in affordable housing projects in Maharashtra India. A field study was carried out in Dhule town between July and November 2012, comprising on-site and literature investigations in addition to interviews with key persons such as engineers from MHADA, who are involved in construction of affordable housing projects. Although this study attempts to cover most of the factors influencing the use of building materials& construction methods & techniques, the focus has been to investigate the impact of processed building materials for building construction & development of affordable housing model for urban areas[5].

**Omkar Kulkarni, et., al., 2014;** Housing in India has extensively become a money mending business. Several private sector companies have made housing affordability in India elusive for a common man. The elevated housing costs, however, are not in proportion with the growth of per capita income. This relation is well articulated in this paper. A scrupulous relation between housing and building material costs (H&BMC) and gross per capita income has been established, thus coming to a conclusion of polarization of economies and widening of gap between rich and poor; making it imperative to scrutinize the issue[6].

**Kalpana Gopalan, et. al., 2015;** Affordable housing is a problem that many countries are taking stock of, world over. In India, the problem is much more stark with an estimated shortage of around 18 million houses, with 99% of this in the economically weaker sections of society. This paper sets out the definitions of affordable housing in India and across the world; 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 learnings from international experience in this sector[7].

**Iwuagwu Ben Ugochukwu, et. al., 2015;** The rate of urbanization in Nigeria has witnessed tremendous increase in the last five decades. Census in the early Fifties showed that there were about 56 cities in the country and about 10.6 percent of the total population lived in these cities. This rose dramatically to 19.1 percent in 1963 and 24.5 percent in 1985. Today, the national population is estimated to be about 160 million with the urban population constituting about 60 percent. The phenomenal rise in population, number and size of our cities over the past few years have manifested in the acute shortage of dwelling units which resulted in overcrowding, high rents, poor urban living conditions, and low infrastructure services and indeed high crime rates. Various programs have been implemented to address housing problem. Despite all these interventions, Nigeria's housing problems still remain intractable. The paper recognizes that what Nigerians need to survive the wounds of near-homelessness include good governance, increased access to land, credit, affordable housing and environmentally sound and serviced human settlements. The paper examines the national housing need and housing provision, major constrain in delivery of low cost housing in Nigeria and conclude by recommending locally produced building materials and intermediate technology which can reduce construction cost by about 60 percent as an affordable strategy for construction of low cost housing in Nigeria[8].

**Deepti Pande Rana, et. al., 2016;** Urbanization is generating a massive housing shortage and the growth of slum conditions in India. This growing concentration of people in urban areas has led to problems of land shortage, housing shortfall and congested transit and has also severely stressed the existing basic amenities such as water, power and open spaces of the towns and cities. This is primarily due to the skyrocketing prices of land and real estate in urban areas. Development of large-scale affordable housing is the greatest necessity of urban India today. The objective of creating affordable housing is to provide adequate Affordable Housing shelter to all. Creation of affordable housing should encompass both – enabling people to buy and to rent, for which there is a need to put an institutional structure in place. While the concept of affordable housing seems to be a simple solution to current housing woes, its execution remains complicated due to the unclear policy framework. To make affordable housing work in India, it would require “will” from all the stakeholders by slightly adjusting their interests towards a wider social cause [9].

**S. Baqutaya, et. al., 2016;** Shelter is a fundamental human need. Housing plays a vital role in people's wellbeing while equally contributing to the physical and mental health, education, employment and security outcomes for individuals. Still, so far the major challenge is housing issue particularly on the establishment of adequate affordable livable home standards for the nation; and failure to achieve that will lead to a housing stress. For that reason, this study presents a research on issues related to affordable housing among middle-income groups. It examines on how certain issues of housing affordability affect societal well being. The purpose is to

present an overview of affordable housing problem and to set out a series of options that should be considered as part of a comprehensive “way in managing these issues”. Data was gathered from fifty respondents, using “housing issues questionnaires”. The accumulated data were then analyzed; descriptive statistics were used to interpret these issues. The key findings indicated that three main housing issues faced by middle-income groups are housing price, housing loan and housing schemes’ policy. Hence, it is highly advisable to address these issues to ensure the vast majority of the population are affordable to own livable property and directly may enhance the quality of life [10].

**Anindo Sarkar, et. al., 2016;** In this paper, the Government of India's programmes for affordable housing in India, is criticized, viz. the Rajiv Awas Yojana and Housing for All 2022. The efficacy of these policies is analysed in being able to provide the sections of the population who are unable to avail housing from the formal market, both through direct support and most importantly in addressing the many distortions that have made the housing unnecessarily expensive, while taking away much of the value to consumers. It is argued that while these programmes and policies are a major advancement over the previous approaches, they do not fully exploit the potential that is there in increased FSI, sensitivity of low cost housing development to exploiting locational value appropriately, to use of government land judiciously, to the reform of titles and squatter rights, and to more efficient land use changes. They are also constrained by an inability to distinguish between what the markets can be coaxed to deliver and where state intervention becomes necessary [11].

**M. Ravi Kanth, 2016;** Affordability is measured in terms of disposable income and affordable housing is categorized in terms of cost of a house, as a proportion to the total income of a household. For the urban poor, the cost of affordable house should not exceed five times the household gross annual income and the EMI/rent should not exceed 30 per cent of the household’s gross monthly income. As a result, providing affordable housing is a daunting task, particularly when the cost of building material and land prices are on the rise. The gap between supply and demand of low cost housing for this income category is increasing, since it is impossible to construct a house within affordable limits for this group. If left to the market forces, builders will target the groups with a predictable and regular disposal income. Thus, middle income and high income groups become an obvious choice, since they are considered bankable. Lack of market support in favour of poor households, limits the supply of housing for them and blocks the opportunity of aspiring households, resulting in increasing financial stress, personal underachievement and societal costs [12].

**Shaikh Ajim, et. al., 2017;** Housing is a basic need of human being. But this is out of the means of low income householder who constitute majority of the population in the country. Low cost housing become must in civil engineering. In this report some methods of low cost housing given. Present situation present trends and future trends about low costing housing in India is given. A few low cost materials are developed and discussed in this report. It includes an important chapter as specification. The material needs for real construction of house are specified. For example, use of solid blocks or low cost housing and bricks for common housing[13].

**S.F. Husain, et., al., 2018;** “Pradhan Mantri Awas Yojana”, a noble mission to construct 20 million affordable housing units by the government is an ambitious scheme with challenges. The government is all set to spend a minimum of one lakh rupees on each housing unit. This fund will be used to rehabilitate and thereby improve living conditions of Indian slums by providing affordable

housing. The various challenges faced include replacing slums with low-cost sustainable construction with structural integrity that can withstand Indian sub-tropical conditions. This paper is a review of literature available on the construction and design of Low-Cost Modular Housing (LCMH). The main objective of the study is to provide the information to the industry with an option of using low-cost housing that can effectively provide an alternative to conventional housing construction and help into improve the living condition of people in Indian slums[14].

**Manjesh Srivastava, et., al., 2018;** Low cost housing refers to those housing units which are affordable by that section of society whose income is below than median household income. 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 economical 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 cover the use of local materials in the different components of building to make them as low cost available solutions for low income groups. To own a house by middle and lower income groups in today's economic trends is very difficult. Therefore, it has now become a necessity to adopt cost effective, innovative and environment-friendly housing technologies for the construction of houses and buildings and availing them at low cost comparatively. In order to come up with viable solutions this paper compares the construction cost for the traditional and low cost housing technologies and it was observed that with the use of technology and reuse of waste material as building material the cost of construction can be minimized to an extent. It was observed that with if the filler slab can be used as an alternative to conventional slab the cost of construction can reduce upto 25%. With the time more studies are going to identify the reuse of waste material like flyash, rice husk, etc as building material. After realizing the true potential of these waste materials as building material in construction industry the cost can be minimized to a greater extent. In addition the building up of cooperative to supply those alternative raw materials rather than importing from somewhere else would help in reducing the cost by 20–30% [15].

### III. METHODOLOGY

#### 3.1 Observations:

- Grade of cement: M25
- Type of cement and brand: OPC
- Specific gravity of cement: 3.15
- Specific gravity of coarse aggregates: 2.7
- Specific gravity of fine aggregates: 2.7
- Fly ash percentages: 30%.

**Non structural elements:** For Non-structural elements the low cost materials such as pre cast concrete frames, Hollow concrete blocks, concrete flooring, are provided and cost is calculated.

**Total cost of building:** The quantities of structural elements such as footings, slabs are calculated by dimensions for the given plan and the materials for those elements such as cement ,fly ash, coarse and fine aggregates were taken and individual quantities are estimated. The cost of different materials had been taken as per Standard schedule rates and the cost is calculated for some elements for Affordable housing according to their quantities and finally the values are compared with conventional building.

1) Here in this report a house has been proposed having the following specifications:

- Size of room = 3.05 X 3.70 m<sup>2</sup>
- Size of bath = 1.10 X 2.2 m<sup>2</sup>
- Size of w.c. = 1.00 X 1.20 m<sup>2</sup>
- Plinth area = 22.45 m<sup>2</sup>

- Plinth height = 650 mm
  - Depth of foundation = 1000 mm
  - Wall thickness = 300 mm
- Wall height from plinth level = 3000 mm

**Estimations:**

Sr.no.	Particular	Affordable Housing	Conventional Housing
1.	Excavation for foundation	4213.26	49209.93
2.	Plain Cement Concrete	19643.69	47531.77
3.	Uncoursed rubble masonry	96161.86	247085.65
4.	Plinth filling materials	818.87	2672.89
5.	Damp Proof Course	2320	4640
6.	Brick masonry	111945.6	155477.7
7.	Skirting	-----	2224.13
8.	Flooring and Dado	-----	99062.12
9.	External plaster	38276.1	82622.7
10.	Internal plaster	15828.48	46825.92
11.	External colouring	575.1	11374.2
12.	Internal colouring	741.96	14674.32
13.	Wood work in door and windows	270.6	15520.34
14.	R.C.C. work in lintel and slab	45988.56	45547.06
15.	Steel required for slab and lintels	15,400	20000
<b>Total =</b>		352184.00	844469.00

**2) Specifications of room:**

- Size of room = 7.30 X 2.90 m<sup>2</sup>
- Plinth area = 27.65 m<sup>2</sup>
- Plinth height = 450 mm
- Depth of foundation = 1000 mm
- Wall thickness = 300 mm
- Wall height from plinth level = 3000 mm

**Estimations :**

Sr.no.	Particular	Affordable Housing	Conventional Housing
1.	Excavation for foundation	3460.32	49209.93
2.	Plain Cement Concrete	16155.17	47531.77
3.	Uncoursed rubble masonry	55961.28	247085.65
4.	Plinth filling materials	923.77	2672.89
5.	Damp Proof Course	1664	4640
6.	Brick masonry	98912.32	155477.7
7.	Skirting	-----	2224.13
8.	Flooring and Dado	-----	99062.12
9.	External plaster	40971.6	82622.7
10.	Internal plaster	11116.8	46825.92
11.	External colouring	615.6	11374.2
12.	Internal colouring	521.1	14674.32
13.	Wood work in door and windows	241.08	15520.34
14.	R.C.C. work in lintel and slab	-----	45547.06
15.	Steel required for slab and lintels	-----	20000
16.	G.I. Sheets	2200	-----
<b>Total =</b>		232743.00	844469.00

**IV. COMPARISON**

- Cost of affordable housing (Room 1) = 352184.00  
 Cost of affordable housing (Room 2) = 232743.00  
 Cost of conventional housing = 232743.00

From the above estimations, the cost of affordable house (room 1, room2) is less the cost of conventional house.

## V. RESULTS AND DISCUSSION

Fly ash is used as a natural admixture which develops the workability and strength of the concrete for a longer run. In this study we noticed that the excess usage of fly ash will give a smooth finishing to the walls which will reduce the plastering cost of a building.

We have to adopt the alternative options available in construction industry as discussed above.

Quantity and cost is estimated for structural and non structural elements. Using low cost materials in non structural elements cost can be reduced. So we can adopt them.

The overall total cost of the Residential building can be saved up to 60% .

## VI. CONCLUSIONS

It is therefore expected that the findings and recommendations emanating from the study have advanced our understanding of the challenges and solutions to construction of affordable housing for the urban poor. The adoption of the various recommendations made above, housing problem could be successfully tackled.

cost effective technologies are available in the field of housing construction. Among these, the cost- effective technology has the advantage of economy in construction, saving of time and energy and of the optimum use of materials. Since the building materials are locally available the huge transportation costs incurred for transporting the materials and the delay in construction can be avoided.

Quantity and cost is estimated for structural and non structural elements. Using low cost materials in non structural elements cost can be reduced.

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