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Low Cost Housing

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Abstract: ***Infrastructure is exigent need of human beings. But maximum percentage of folks comes under this low income group which can't even purvey the basic things .In the following research various techniques are mentioned as affordable housing plays important role in civil engineering. Definition Itself defines the technology used to provide housing units so that the underprivileged groups can be given the infrastructure. So, in order to provide housing schemes for LIG (Low Income Groups) and EWS (Economically Weaker Society) as effectively as possible there is need to redefine National Housing and Domain stratagem. The affordable housing basically depend on three distinct criterion capital level , size of infrastructure, and reasonability. The purpose of this research is to shed light on the various methodology found in recent era and focus on the various aspects of predefined building methods and the economic benefits derived from them. The walls, floors and roof are the most important sections in a building, which can be analysed as needed, thus improving construction speed and making overall construction affordable here the various section of structure are analysed including superstructure, base sections. The research paper also set a sight on maximum usage of native materials for different components of structure so that overall cost can be retained reasonable to be afforded by LIG. In the current world of financial competition, it is very important to facilitate an reasonable , eco-friendly and innovative infrastructural units so that moderate and economically weaker society could have residency. To cope with task of providing cost effective but innovative technology for house building current research contrasted with prosaic method and low cost housing technology. The research aims to effective implement of innovative technique called Rammed Earth, which if used in accordance with RC Filler Slab instead of prosaic or traditional slab could reduce the effective cost by an quarter i.e 1/4th of regular. Further research will result in recycling of trash products like flyash and rice husks as construction components. The cost can be minimized once the true potential of this used completely. Furthermore, setting up co-operatives for bestow substitute primary materials minimize cost by 20 to 30 percentile rather than utilizing the non-native materials.***

Keywords: Cost effective structure, Conventional method of construction, LIG, EWG, Rammed Earth , Locally Available material, Recyclable material

I. INTRODUCTION

Erection of structure by utilizing locally available structure can play important role in overall cost of structure Using locally available materials and still managing to reduce costs is low cost housing. By use of native material can bring the effective cost at its minimal as distance of transportation from production to site can be reduced thus reducing the lead distance. At the first instant the reduction in cost in percentile can be in single digit number but for megaproject such reduction in percentage can play the vital role as such projects worth in millions of dollars. For last decade infrastructure industry have been undergone heavy innovative changes creating a huge capitalistic competition among it ,so it is complicated to get house at modest price. Thus Low cost housing can give huge benefit among the economically weaker section and lower income group. Effective forethought, structured organization and proper management with utilisation of substitute element such as naturally as well as artificially obtained by-products of different industry such as flyash ,fibres can be more suitable alternative for conventional material. One of the suitable process authorized by an Indian Institute of Technology is fibre reinforced gypsum wall panels are stronger in tension as well as 15% lighter as compared to conventional brick wall structure. Cavities of such wall can be filled with the mixed solution of gypsum and hydrated water reduce the overall weight. Modular Planning is the process of prefabricating the component of structure off site in very controlled manner and importing finished component on site ,such utilization of method can reduce risk of damage of structure and once structure is erected it don't have the need to patch ,cut or shift the component as it was made with perfect measurement in terms of few inches. Size of housing unit can also hit the economy of whole structure generally corner structures are avoided and square shaped or rectangular shaped are provided joint units can minimize the cost of element orientation of unit also vary the cost a minimum carpet area of 120sq.m is mandatory. There are few requirement for Ideal house that must be fulfilled by an low cost housing structure which includes strength ,stability against various natural as well as structural loads like seismic forces, dead loads etc with respect to Indian Standard Codes the one must also taken in consideration the comfort and insulation against heat and wind for housing schemes.

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II. CURRENT CASE

A. *Problem Statement*

Under the Guidance of government India ,Central agency have aim of providing the 20 million affordable houses by end of financial year for EBC and LIG but it have the obstacle of in-time delivery and dependency as many of schemes of India are integrated by conventional techniques and having reliability issues as well while low cost housing may play important role but the Low cost housing sector is in immediate need of technological development and modernization from standard prospective so that living of standard of millions of people under poverty line. As an researcher it is an absolute requirement of developing the methods taking in account future benefits and current statement to learn novel substitute for conventional techniques in according to prudent and speculative way for enhancing the living condition of low class income group for communal and economical expansion of country

B. *Objectives of the study*

These are the following objectives involved in research

1) Optimizing the wield of locally available material so that overall cost of construction can be reduced
2) To avail infrastructure at modest price by implementing new technology
3) To distinct overall criteria in terms of cost, methodology and materials used
4) To juxtapose conventional method of construction with newly developed method of low cost housing method of construction
5) among all the method available designating best suitable and economical technique
6) Expounding of results from observation obtained from case study has been used for investigation Concluding the thesis based on results obtained

C. *Various Techniques of Affordable Housing*

1) Gypsum wall panel with glass fibre reinforcement

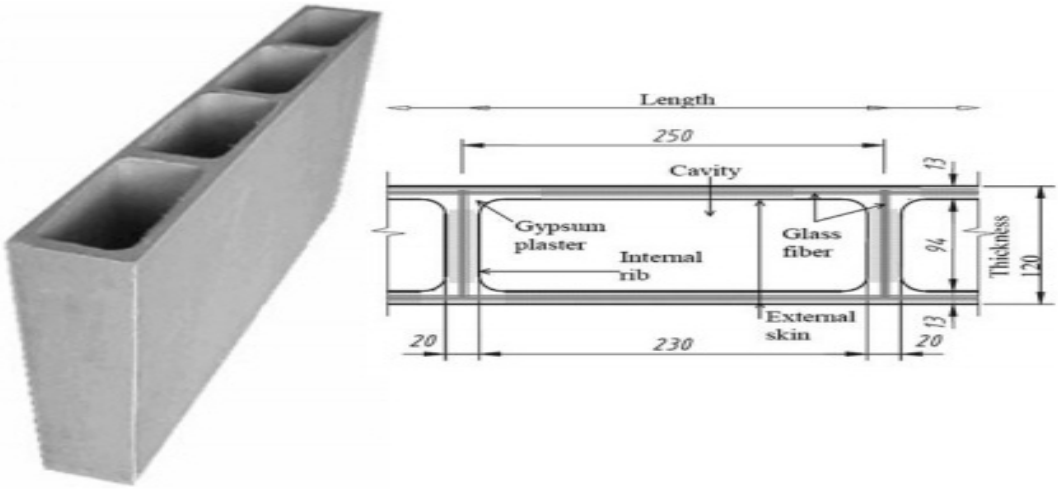

Fig. 1 Glass Fibre Reinforced Gypsum wall panel section (GFRG)

GFRG block were originally introduced in 1990 in Australia but later the technique brought to India and then remodeled and Convicted by IIT madras such that it can withstand temperature upto 1000 C and have exception moisture resistance capacity along with strength it is very light weight with unit weight of 1444kg.

The length of cavities of GFRG block varies from 250cm to 500cm for large structures. Due to light weight and high compressive strength the overall cost of wall building can be reduced upto 35%.

Standard size of GFRG blocks –

10mX 3m X 124mm

12m X 3m X 120 mm

Due to large length it can be also used in roof panels. In the block where two members converges are to be filled with high grade of concrete to assisting maximum rigidity to structure while 3rd cavity of block could be pored with M20 grade thus providing structure a good stability against seismic forces

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2) Flat slab or voided slab method

Fig. 2 Flat slab or Voided slab

Cobiax is a leading manufactures providing services in voided slab technology based in USA. In india recently such techniques are being used as such method can give advantage of long span with exclusion of beams and having fire resistance of REI 180 rating. The main advantage of Cobiax system is reduction of concrete and steel in zone where positive bending moments are formed which minimize the unit weight causing less dead load of structure which provide benefit of higher stability. As there are no beams involved it can be used in shell or curved structure. Due to concrete cover of 3mm dead weight is dropped upto 30% .Thus direct loads on footings get reduced furthermore, giving more rigidity in same size of foundation. Cobiax are known for making eco-friendly components.

3) Mivan Formwork method

Fig. 3 Mivan Formwork method

Invented in Europe in 1990, this system of formwork is being used extensively in India last few years, the principle advantage of this technique is time requirement of construction is very less and reuse of material cuts the cost very boldly. Also government of India is utilizing the technique under Slum rehabilitation system for providing roof for 20 million people by 2022.

The prime constituent of Mivan system are

a) Horizontal element which include panel for wall , rockers and stub-pins

b) Transverse elements which include transverse panels and props for soffit beam

c) Constituent for slab include prop and panel for deck

Principal advantage of this formwork system is as system come as single piece of aluminum sheet of 4mm thickness reduces requirement of man-force and thus reducing time of completion. Aluminum formwork gives very plan and perfect finish to the component of structural element. This system gives advantage of hustle-free removal and assemble of formwork as whole system is joined throughout by nut-bolt system. The system has cycle time of 250 times.

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4) Precast Method of Construction

Fig. 3 Precast Members

Precast construction is being used in all over the world from few decades, in this method pre-designed molds were pored of site in a very controlled environment and the cured structural element will be transported to the site for erection of structure. Many government agency like MHADA and NHDA are using theses system in urban region as space in such area are restricted special plant is need to be constructed for Precast members it removes the risk of being damaged or errors in dimension as components are manufactured in controlled environment. For multistory buildings as all members are already casted offsite it eliminate risk of accident which happens on high-rise concreting, such precasted elements don't have requirement of curing thus maximizing the speed of construction and timely completion of work. The precast method of construction is simultaneous work of transportation, stalk and then assembling but these requires the heavy machinery and multi-wheel cranes as in single day 20-25 structural elements can be constructed and result may vary according to availability of equipment and skilled human resources. These system can be expensive for small scaled infrastructure project as one has to setup complete plant for elements to be casted but for mega project as time is limited and margin for error is less this system could be utilized and for such project the time of completion can be reduced upto 20-25 % compared to convention method of construction

D. Findings

After studying all the available method we can conclude

1) Affordable housing method mentioned above have upper hand as compared to convention construction techniques
2) Significant cost cut can achieved by implementing these method by maximizing use of native materials
3) It is a major lead toward a developing the method which have modest cost but which reliable
4) Even though these system have reasonable overall cost of construction it is also noted that system need skilled human resources and special assembly of system.

III. METHODOLOGY

The investigation signifies on the innovative ways of minimizing the cost of housing unit so that reasonable financial system can be gained. For sake of that comprehensive study of literature given by expertise in different sector of construction field which gives us in-depth view of available technology in current era and then organization of that data is made and distinct method among all is marked out for further study is made. Then further investigation is done on problem and difficulties for implementing the technology in rural as well as urban area if there is one method which is most suitable for construction then its advantages and limitations are further studied. According to commonly accepted and suitable method a case study has been done to get to know practical advantages and its limitation's according to local conditions and shape, size and technology implemented and thus finally a conclusive mark has been done.

Following are the key element taken in consideration while investigating

A. Adoption of site Location
B. Selection of model housing unit
C. Distinguishing economically weaker ménage like EWS and LIG
D. Investigating minimum revenue limit for primary stage

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IV. CASE STUDY

Fig. 4 Sample of scheme of UIT by HUDCO

1) Name Of Project- Shivaji Park, Rajasthan
2) Area Covered – 312 acres
3) Cost of Project- 1350 million rupees

The project is done under the authority of Urban Improvement Trust (UIT) guided by central government in the year 1983 at the time population of Alwa district was 3,48,000 people. UIT was leading and governing organization in infrastructure and development and 34% of people were below poverty line. The Project was sponsored by the HUDCO ltd. Housing and Urban Development corporation

The complex in shivaji park complex is situated near 2-3 km from the nearby social as well as economical center enabling the resident the quick access to these important facility and the region is supplied with continue supply of electricity and running water

A. Area of Housing Units

Each Household plot were allotted the area of 388squre.foot ,while empty plots size varied from 775sq.ffot to 1076 sq.foot around 80% of EWS and LIG had a facility of 1RK that is 1 room and kitchen with attached water closet. The scheme was also provided with commercial shops area 100sq.foot to 150sq.foot for providing financial advantages to residents.

B. Scale of the Project

Area of 312 acres subdivided into region of 52 acres each and for each region there was complimentary Parks were provided and each housing units were constructed in system of grids for comfortable residency among it except 20% of resident have single story building but major problem is many of housing units have no open space which violets the building act1964.

C. Benefits in Term of Living of Standard

It is found out that considerable growth have been seen in-terms of living standard of citizen in first 10-15 years of living there is steady growth of 10-12% in income of LIG in the region a research also notify that the benefits are due to location of the case study which is connected to the region by good infrastructure provided with basic facilities. Negative impact is also seen in other region where the location of such scheme is chosen without proper strategy and planning

D. Flow of Finance Among Residents

After surveying 120 land owners in UIT developed region it is found out that around 78% percent of household has gained there income by twice or thrice of original due to which 65% resident of economically weaker section is been transferred to medium income group in 1-2 decades. Thus project helped to improved the life of citizen
in terms of financial stability

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E. Snag in Scheme

As in such scheme are based on the lucky draw system, rate of fulfillment having house at low price by EWS is very low and often its very hard and difficult for economically weaker section to get income certificate from governing bodies as there occupation is seasonal And most of them tends to live outside the city circle so our current investigation lead us to the lack of proper structure in such a schemes.

F. Reimbursement Policy for Housing Units

The effective price of house in shivaji park was 14000 rupees but after tax and surcharge applied the cost price of Each unit was around 27,500 rupees for economically weaker sections besides the HUDCO and other National bank landed over the house at an interest of 4 % with down payment of 10% of total cost and EMI of 200rs to be fully paid within the allotted period which is modest deal that citizen can get.

G. Economy and Unit Value

TABLE I
House prices and income ratios

Year	Median House Price (Rs)	Median Annual Income (Rs)	House/Income ratio	Additional capital (Rs)
1983	27500	8100	3.3	-
2017	65000-140000	65000	1.1	16000

Due to growth income of residents over the two decades the EMI and load was paid of earlier than total period thus reducing the interest over each housing units thus the average price of house was 40 thousand at the start of 2000's due to rapidly growing economy and connecting of rural area to urban due to growing infrastructure the prices of house skyrocketed from 40000 to above 1 lakh rupees. And the family who tends to earn 4 thousand per annum has achieved the growth and in early 2000's there gross income raised to 65 thousand per annum at the time of construction of Shivaji park unit price of each housing unit to the gross per annum income of resident was 3.3 and at the start of year 2000 it reached to staggering 1.2. Due to increase in cash flow, market growth, and improved standard of living.

V. CONCLUSION

It is an absolute necessity to adapt to new cost efficient housing techniques than convention one so that a modest price ranged, durable and timely completion of housing units can be done. From the study of case study we can conclude that socio-economical parameter affecting the affordability of houses. While considering LIG and EWS from study the house price to annual income ration dropped from 3.3 to 1.1 in just 2 decades thus the location of such project could primly considered during initial planning. Thus engineer must posses the knowledge of alternative techniques and must have good technical , locally available material and administrative skills.

VI. FUTURE SCOPE

Low cost Housing is huge subject to research thus it have major area that can be researched further,

A. Study could be made in use of recyclable material in cost efficient housing which eco-friendly and non-toxic
B. Study can also be done by replacing conventional material to the supplementary material so that effective cost of structure could be reduced
C. Low cost housing could be also researched in terms of labour cost as nowadays more mechanised way of structural erection could achieved at less price
D. One can do a research in different government policy for economically weaker groups as such policy often includes flaws and loope-holes

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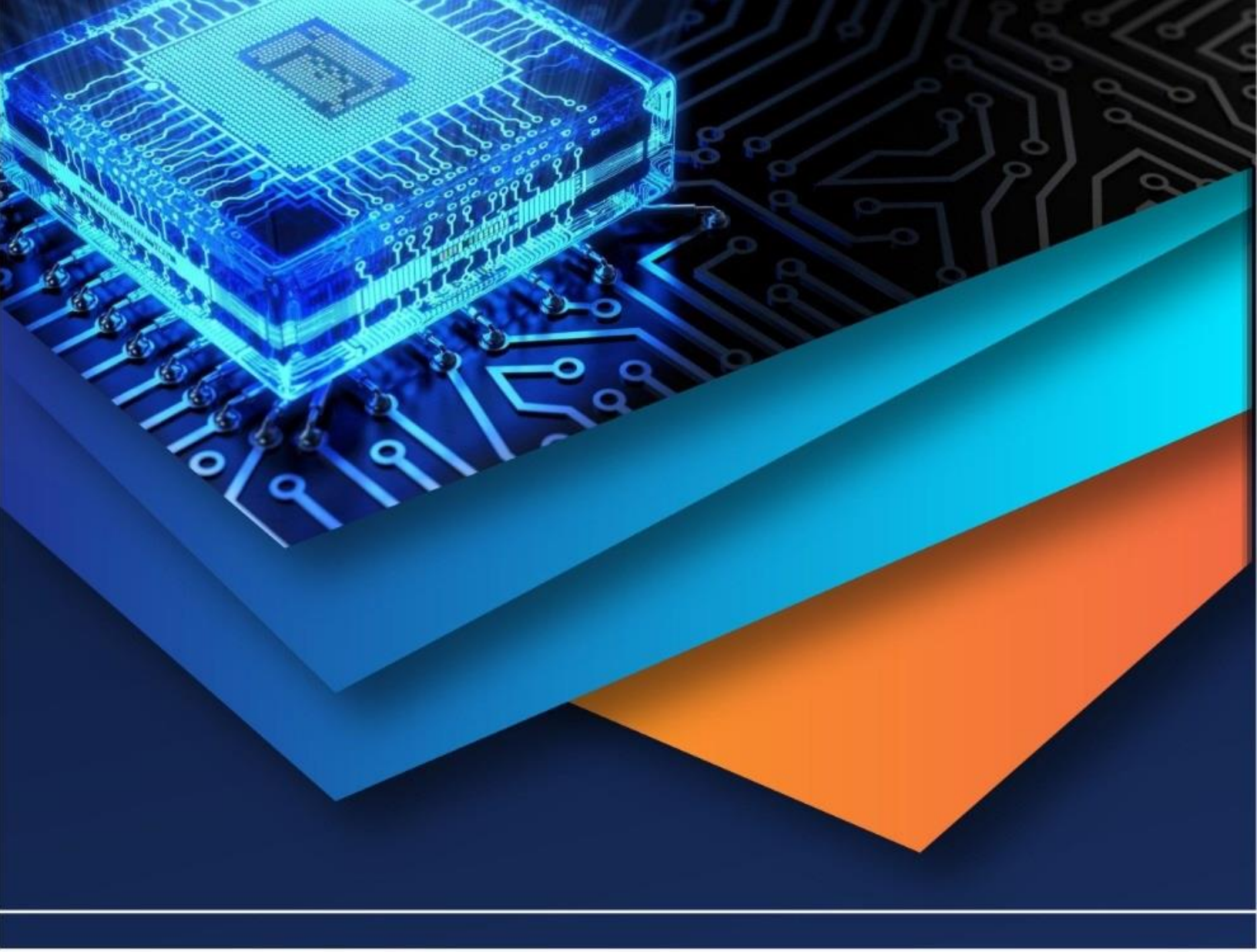

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