

Adoption of Low Cost Housing in Present Scenario

Dr. Jyoti Shukla

Post Doctoral Fellow, Department of Himalayan Studies, HPU, Shimla, Himachal Pradesh, India

ABSTRACT: The problem of housing has been assuming serious proportion in view of phenomenal increase in population and need for residential accommodation. The gigantic challenge of providing houses for all can only be met by application of low cost, energy saving, labour oriented and environmentally sound technology which can use local resource rationally. The study involved in exploring the different types of cost effective building materials and techniques used by homemakers in construction of their houses. The study was undertaken in Delhi and Hisar city of Haryana. A sample of 100 households was taken, out of which 50 respondents from Hisar and 50 respondents from Delhi. Majority of respondent had used brick of IInd grade for foundation work. Among the cost effective building materials for wall, maximum number of respondent had used pre-cast hollow concrete block. There were various types of cost effective technique for wall which was used by respondent but maximum per cent of respondent had used rat trap bond. Regarding the satisfaction level of cost effective building materials and techniques, for random stone masonry, lime mortar, brick of IInd grade, pre cast hollow concrete block, single brick thick load bearing wall, cement concrete stone wall, jute stalk board, carbel, stone lintel chajja, the satisfaction level was high.

I. INTRODUCTION

Shelter is one of the basic needs of human beings. Providing housing is one of the most sound and daunting task and is receiving utmost attention of government at all levels and various agencies. In India house is still a dream to many people. Scarcity and high cost of building material against the rising demands for housing, the increasing population now days have necessitated the scientific use of all available material in construction (Mishra, 1988). One should remember that low cost technology doesn't mean sacrifice of quality and durability. It only means avoidance of extravagance, over engineering and minimizing the use of costly material like cement, steel, timber etc. (Murthy, 1987). The future prospect and possible solution of housing problem recognizes the need for an integrated management concept for the proper management of human settlements in the country. Improvement in housing conditions will involve the formulation and adoption of realistic and performance oriented building standard to promote low cost housing (Obudho, 1992). As a result of use of innovative technologies, the house could be built at around Rs. 315/- per sq. ft as against the conventional cost of order of Rs. 600/- per sq. ft. (HUDCO, 2000). Use of precast concrete structural element in mass housing scheme ensures better quality of construction and speedy execution of work. A considerable saving, both in construction time and cost could be achieved in prefab housing. (Patwardhan, 1993). Hence, keeping in view the housing cost, the study has been conducted with the objective :

To study the cost effective building materials and techniques used in construction of house.

II. METHOD

The study was conducted in Delhi and Haryana State. A total sample of 100 respondents were taken Sample selection was done by using snow ball sampling technique i.e. starting with few known homemakers who had constructed their house by using cost effective building materials and techniques and asking them to name friends, relatives or associates who had also used same materials and techniques for house construction. With the help of questionnaire schedule so developed, the data were collected

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III. RESULTS

Results of the present study are presented under the following section:

General profile of the respondent & family profile includes respondent's age, education, employment, family type, family size, Monthly family Income etc

The probing of data revealed that more than half of the respondent (68.0%) belongs to middle age group followed by young age groups (30.0%) where as meager portion of the respondents were in old age group. Regarding the educational status of the respondents nearly half of the respondents (44.0%) were graduate followed by the one-fourth of respondents who were post graduate. The educational level of 19.0 per cent of the respondents was just intermediate. Regarding respondents spouse, it was evident from the table that more than three fourth of the respondent's spouse (78.9%) were post graduate. Only 17.0 per cent of the respondent's spouse had graduate degree. Negligible portion of respondent's spouse having intermediate degree (5.0%).

The data further depicts the occupational status of respondents. Nearly three fourth of the respondents (73.0%) were non working followed by private employment (14.0%). Meager portion of respondents that is 7 per cent and 6 per cent were in government service and self employment respectively.

Respondent using different types of cost effective building material :

Over a period of time varieties of building material have been manufactured and used ranging from rudimentary adoption of earth construction to highly complex manufactured materials like cement and steel adopting sophisticated technologies with increasing demand in the construction industry, the value addition to these material has become faster and the technology with shorter obsolescence period seemed to be more dynamic.

By the use of appropriate cost effective building materials and techniques one can reduce the cost of construction to a larger extent. The Table 1. Illustrates the number of respondents using particular cost effective building materials and techniques, for various elements of house.

i) Foundation: There were four techniques which were used by the respondents for making their foundation cost effective like more than three fourth of the respondents had used brick of IIInd grade for foundation work. 34 per cent of respondents reduced their foundation cost by adopting economical specification for foundation that is by changing cement mortar composition. For e.g. under normal site conditions the specifications was like 15 to 20 cm thick concrete with 40 mm nominal size stone/over burnt brick aggregate and 40 per cent mortar comprising of lime : 2 sand/surkhi on 1 lime. If this composition is used one can have cost effective foundation. Usually in foundation, over the cement, concrete bed brick and cement is used but if in place of cement concrete, lime concrete is used the cost of foundation can be reduced. It was reflected from the study that 23 per cent of respondent had used lime mortar instead of cement concrete. Nearly one fourth of the respondent had used random stone masonry for foundation work.

ii) Wall: Wall is one of the important structural elements in building and housing construction, which on an average accounts for 25 to 30 per cent of cost of construction. The energy efficient and cost effective walling material used by respondent were clay flyash burnt brick, flyash lime gypsum product, precast stone block, precast hollow concrete block, clay red mud burnt brick. Among all these material pre cast hollow concrete block was adopted by maximum number of respondents that is 37 per cent. The reason for high rate of adoption may be that, these blocks saves 20 per cent of total cost of housing against conventional solid masonry. They enable speedy construction and the cavity in the blocks provides better thermal protection and did not need external or internal plastering. 10 per cent of the respondents had used clay red mud burnt brick. It may be due to its good architectural value. Out of total respondents (100) only 10 per cent of the respondents had used clay fly ash burnt brick. Though it saves about 25 per cent of total cost of housing against conventional methods yet only 10 respondents had used it. The reason associated with it may be that respondents faced problem in availing these brick and also they have less faith on it, because of the use of fly ash in the bricks. Negligible per cent of respondents (2%) had used fly ash lime gypsum product. Precast

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stone block was used by only 6 respondents. There were three cost effective techniques for wall which were accepted by respondents. These were single brick thick load bearing wall, cement concrete stone wall, rat trap bond etc.

Rat trap bond was used by more than one fourth of the respondent (26%) By this method 25 per cent of total number of bricks for construction can be saved and it was 40 per cent economical. 16 per cent of respondents had used cement concrete stone wall. Single brick thick load bearing wall was adopted by 7 per cent of respondent. It may be because it results in up to 15 per cent economy in cost of construction.

iii) Roof: The cost of roof was approximately 25 per cent of the total cost. The availability of steel and cement was also getting difficult day by day. A reduction in the cost of roof/floor in a building along with the reduction in the consumption of steel and cement is thus a prerequisite for having cost effective roofing. There were various cost effective building materials and techniques for roof. Out of which concrete hollow block was used by maximum number of respondents (18%) followed by Jack arch roof (9%). The cement bonded fiber roofing sheet was adopted by 8 per cent of respondent. It may be because cement fiber roofing sheet was 50 per cent cheaper than AC/CGI sheet. Only 5 per cent of respondent had adopted fibrocement channel/shell unit. The associated reason behind it may be because respondent were not easily getting it. Minimum percent of respondents had used filler slabs for roofing. The reason for its adoption may be because it saved 2 per cent of total cost of construction of roof. Maximum number of respondents that is 62 per cent had done shuttering of their roof by using wood. In 12 per cent of respondent's house there were few rooms having lower ceiling height.

iv) Door and window: Doors and window not only solves ventilation purpose but it also provides good aesthetic value to the house. It forms about 10-15 percent of total cost of house. The cost effective door and window used by respondents were PVC door and window, precast RCC door window frames, natural reinforced polymer composite door, ferrocement shutter, flush door window E-27, Resin oxychloride and cement bonded sawdust based door window frame. Among these doors, and windows natural reinforced polymer composite door, window and flush door window was used by maximum number of respondents

v) Partition : The partition building material which was used by the respondents were bamboo play paneling, jute stalk board medium density fiber board, particle board rice husk board etc. Out of all the partition building material particle board was used by maximum number of respondent (9 per cent). Meager per cent of respondents (2%) had used medium density fiber board. The reason behind it may be non availability of material lack of knowledge to respondent about it. Another cost effective building material like Bamboo play paneling, which was made from bamboo mats with appropriate resin bonding and pressing was strong, durable, water proof, termite proof, fire retardant. It was used by 5 per cent of respondents. Rice husk board was adopted by three per cent of respondents. It may be due to its property like lower in price as compared to products made from wood based board.

vi) Miscellaneous : In order to increase the aesthetic value of the house and also to have cost effective housing, there were various cost effective, energy efficient building material, techniques used by respondents like brick arches, corbel, brick jalis, ferrocement water tank, single stock system of plumbing, stone lintel and chajja etc. Brick arches which was less costly than reinforced arches, was adopted by 38 per cent of respondent. It may be because it was strong and aesthetic to look. For the spanning of opening in a wall corbel was used by 10 per cent of respondent. It was an inexpensive way of spanning an opening. In this each course of brick project out by 5 cm, beyond the course below until the bricks meet together in the middle. It did not require centering.

Table 1. : Respondent using different types of cost effective building materials/techniques.
N=100

Building material/Technique	Frequency/ Percentage
A. FOUNDATION	
1. Random stone masonry	21
2. Lime mortar	23
3. Brick of IInd grade	79
4. Cement mortar composition	34
B. WALL	

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I	Building material	
1.	Clay fly ash burnt brick	10
2.	Fly ash lime gypsum product	2
3.	Precast stone block	6
4.	Precast hollow concrete block	37
5.	Clay red mud burnt brick	10
II.	Technique	
1.	Single brick thick load bearing wall	7
2.	Cement concrete stone wall	16
3.	Rat trap bond	26
C.	ROOF	
I.	Building material	
1.	Cement bonded fiber roofing sheet	8
2.	Micro concrete roofing tile	4
3.	Jack arch roof	9
4.	Ferro cement channel/shell unit	5
5.	Concrete hollow block	18
6.	Filler slab	2
II.	Technique	
1.	Lower ceiling height	12
2.	Wood shuttering	62
D.	DOORS/WINDOW	
I.	Building material	
1.	PVC door, window	6
2.	Precast RCC door and window frames	2
3.	Natural reinforced polymer composite	8
4.	Ferro cement shutter	2
5.	Flush door window E-27	8
6.	Resin oxychloride cement bonded sawdust based door and window frames	2
E.	PARTITION	
I.	Building material	
1.	Bamboo play paneling	5
2.	Jute stalk board	7
3.	Medium density fibre board	2
4.	Particle board	9
5.	Rice husk board	3
II.	Technique	
1.	Half brick work	5
F.	MISCELLANEOUS	
1.	Brick arches	38
2.	Carbel	10
3.	Brick jalis	38
4.	Ferrocement water tank	23
5.	Single stack system of plumbing	61
6.	Stone lintel and Chajja	22

IV. CONCLUSION

There were various cost effective techniques used by the respondents for foundation like random stone masonry, lime mortar brick of IInd grade, change of cement mortar composition. Out of these, more than three fourth of the respondents (79%) had used brick of IInd grade. For wall energy efficient material adopted by respondents were clay fly ash burnt brick, fly ash lime gypsum product, precast stone block, precast hollow concrete block, clay red mud burnt

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brick etc. To reduce the cost of door and window various cost effective building materials were used viz PVC door, window, and pre cost RCC door. Window frames, Natural reinforced polymer composite, ferrocement shutter, flush door window E-27, resin ox chloride cement bonded sawdust door and window frames. Out of the total users for these material maximum number of respondents has used natural reinforced polymer composite Nearly half of the respondents (46%) had used cost effective technique for more than 68 per cent of total number of door and window. The study displayed that no one has used cost effective building material for flooring but more than half of the respondent (54.0%) had adopted various techniques for reducing cost of flooring.

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