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Indian Rural Housing Needs to Bridge the Technological Gaps

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Abstract- *The housing in rural India is totally based on traditional knowledge of local tradesmen. They are unaware of modern technologies, planning, proper specifications, testing of materials, and structural design of structural components, stability and durability of the structures.The main reason behind this is lack of availability of any awareness program. There are no testing facilities available for testing their building materials locally. Their affordability, requirement and skill are variable, hence no uniform design could be provided as single solution for their problems. In general the conditions of their houses are vulnerable to natural calamities like land slide, flood and earthquake etc., which may be very dangerous for their life and property. Therefore it is necessary to develop a suitable mechanism to help them in construction training and guidance, planning houses, selection of pecification, testing of materials and design of structures etc. in their vicinity. The government should open a series of* ***construction help and guidance centers*** *for designing, drawing and testing facilities where they could get necessary help at very nominal cost or for free of cost. Voluntary organizations and some NGO's may also contribute in this field. In this paper various problems associated with rural housing and few of their corrective measures needed have been discussed to make their houses safe for living*

INTRODUCTION

The statistics of rural housing and their amenities are being represented below graphically.

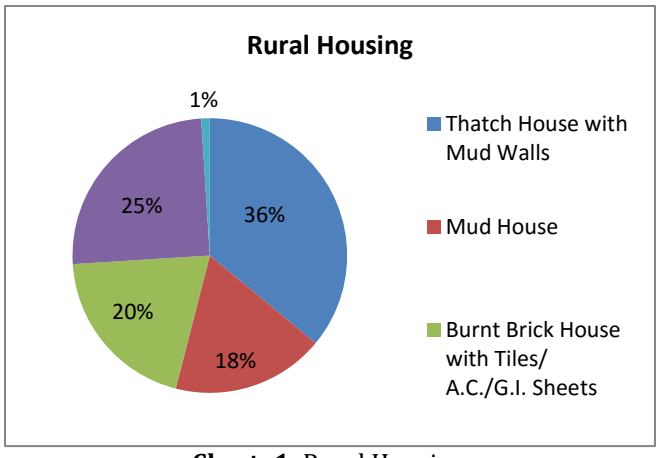

Chart -1: Rural Housing

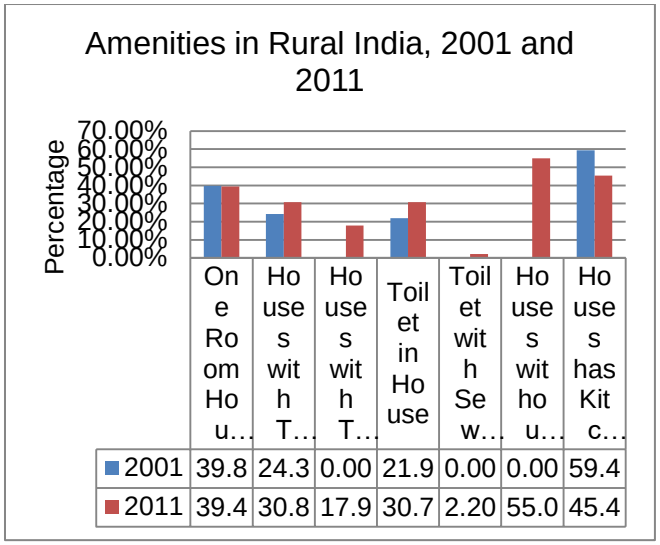

Chart -2: Amenities in Rural Housing

It is obvious that there is a huge scope of developing rural building technologies for their houses and imparting skill and know-how. This article will help the government in framing policies and planning for rural housing system. This is essential for strengthening, modification and modernization of these houses and providing necessary amenities. The following areas in rural housing are problematic:

1. FOUNDATION-

Rural people rarely understand the importance of foundation. They generally provide strip footing as foundation. There is no testing of soil bearing capacity and design of foundation as per super structure load and strength of soil. Mostly they use inferior class of bricks in foundation as they think that it will be buried and would not be affected by weathering effect. However, the strength of these bricks is very low and water absorption is very high, which makes the foundation weak. The only positive point in favor of them is that mostly they built single storey houses, so load intensity at foundation is low. These houses are most vulnerable for flood, landslide and earthquake forces.

2. Damp proof Course-

In rural houses DPC is generally missing or not properly laid, so there is no proper medium to arrest the rising moisture due to capillary action from foundation to super structure. In absence of DPC super structure is badly affected with moisture, which is harmful for the health of the resident and structure also. The houses made of mud or unburned bricks are more susceptible to moisture. Hence chances of their damaging are increased.

3. PLINTH PROTECTION-

Rural people are rarely aware about the function of apron or plinth protection around the buildings, so most of the houses are found without plinth protection. The drains also flow adjoining to their external walls, which is quite harmful for foundation strength and structural stability as the water directly reaches the foundation and make it weak.

4. BRICK WORK IN SUPER STRUCTURE-

Rural buildings are mostly constructed with mud mortar due to economic reasons and external walls are left exposed to weather without any plastering and pointing. During rains mud mortar loses its shear strength due to absorption of water and house becomes unsafe for earthquake. There is no testing facility available for bricks crushing strength or efflorescence; they just judge the quality of bricks by striking sound. In absence of efflorescence test the brick starts to deteriorate, if the moisture approaches the brick masonry.

5. VENTILATION-

It is generally observed in rural houses that the doors and windows are provided only in the front side of room. There is no provision of cross ventilation. The reason behind it, is safety of house from thieves or reduction in cost of construction as the cost of doors and windows are more as compare to walls. They often use wooden paneled windows which are opaque to light and when the window is closed the natural light remain absent in the house.

6. RCC BANDS-

Nearly, all the houses in rural area are made with load bearing walls without any provision of bands. To resist earthquake forces in earthquake prone areas, provision of these bands are essential to provide strength to the structure at different levels like plinth, windowsill, lintel, roof and gable end etc. These bands tie the structure together for better resistance to earthquake vibrations. Absence of these bands makes the building fragile and damaging chances are enhanced during earthquake and landslide cases.

7. PRE CONSTRUCTION ANTI-TERMITE TREATMENTS-

There are many areas, where soils are infested with termite. In such areas preconstruction anti termite treatment is essential. It can be done by providing a chemical barrier but, in rural areas it always remains neglected and no such treatment is adopted. This amounts to heavy damage to structural members due to presence of termites.

8. FIRE HAZARDS-

Majority of houses in interior villages are made of mud and thatch, which are susceptible to fire. In case of fire, thatch burns easily and there are no fire extinguishing provisions in their locality. Only manual and pump water is available for firefighting, which is insufficient for controlling large fire. Hence there is a great need to develop a technology to make their houses fire resistant.

9. RCC STRUCTURES-

RCC structures such as lintel, beams, columns, sunshades and slabs are main structural members which require special attention, it requires following mandatory tests:

(a) Test on coarse aggregate – Size of aggregate, crushing value, impact test, abrasion, grading, deleterious material contents etc.
(b) Test on fine aggregate – Fineness modulus, bulking of sand, specific gravity, impurities test, chemical reactivity test etc.
(c) Test of water – TDS, pH value etc.
(d) Test of cement- initial setting time, final setting time, consistency test, fineness test, loss of ignition etc.
(e) Test on concrete – slump test, compressive strength test etc.

All the above mentioned tests are required to ascertain the quality of concrete for the use in construction works. Concrete mix design is also not possible without these tests. But in rural areas there is no guidance and no

testing facility is available for conducting these tests. Therefore, concrete quality cannot be ascertained. They use large amount of water to make concrete workable, which is dangerous for the health of concrete, proportioning is also arbitrary. There are no design charts or design facilities available for providing and placing the reinforcement, so they go with traditional system with the knowledge of local tradesmen.

10. FORMWORK FOR RCC-

They provide traditional form work with wooden planks, batons and wooden logs (ballies) etc., which are not designed as per loading conditions. Photograph of such formwork is shown below.:

Fig 1-Form Work

It shows that there is no vertical alignment of the vertical members and only temporary loose brick supports are provided at base.

Fig 2- Loose brick support

11. BRICK MASSONARY-

Rural people do not understand the weightage of brick bonds and filling of joints with mortar, as shown in the photographs given below. :

Fig 3- Brick wall with no mortar

Fig 4- Wall with empty joints

Fig 5- Wall with bonding cracks

Such kinds of structures are venerable for earthquakes, flood and other natural calamities, which may cause fatal accidents. They have no facilities for testing the quality of bricks such as, crushing strength, water absorption and efflorescence etc.

12. FINISHING OF WALLS-

Most of the rural people finish the wall with rendering from inside and external portion is left exposed to weather. However, making external portion waterproof is more essential. On the other hand, they use very fine or silty sand in the plastering, which provides very smooth finishing in the beginning but later on it deteriorates very fast, as shown in the photograph.:

Fig 6- Plaster Decay

13. WATER PROOFING-

All structures should be water tight, because structures with dampness are not only harmful for structures itself but it spoils stored material and badly affects the health of human and animals. The reason behind it is the negligence in workmanship during construction and selection of improper specifications and techniques.

Fig 6- Moisture Patches on wall

14. WATER SUPPLY AND SANITARY INSTALLATIONS-

No hydraulic designs are done for water supply and sanitary system and all the pipelines and fixtures are installed arbitrarily. There is no sewer line system for disposal of human excreta and waste water in these areas. Mostly, waste water flows in the open drains or on the roads, which are a source of mosquito menace breeding and under these conditions to maintain cleanliness and healthy environment is also a difficult task.

15. NONAVAILABILITY OF STRUCTURAL DATA-

Rural buildings are generally constructed without proper planning, drawings and details. These drawings includes municipal drawings, foundation details, structural details of RCC members, water supply and sanitary installations etc. In absence of these structural drawings and design, it is difficult to take decisions for safe vertical extension of their buildings or finding out the causes of structural failures.

FEASIBLE SOLUTIONS AND SUGGESTIONS-

A survey should be conducted to collect data for the availability of good construction materials in the country.

The area should be divided in different zones according to availability of materials keeping in view the reduction in imported materials and maximizing use of local materials.

Based on material zones 'Zonal Rural Research Centers' should be established, which may provide cost effective construction technologies suitable for that particular zone.

Each Zonal Rural Research Centre should have their extension centers at each district head quarter. These extension centers will help to extend and demonstrate the knowhow about the technologies, which are developed at zonal rural research centers. In this way suitable rural technology knowhow will be available for rural mass at district heat quarter.

Under the extension centre, Construction help and guidance centers may be established which should be equipped with trained manpower, necessary lab and field testing equipments. These centers may cater the technological guidance about new construction technologies developed including testing of materials/building components. These Construction help and guidance centers should provide technical guidance for about 10 villages which are located within about 20km – 25km radius. In this way material testing facilities and technological guidance will be locally available to the villagers. These facilities should be available either free of cost or with a nominal charges. These centers may also help in providing specifications, appropriate technologies, planning of buildings, construction and supervision of works. These centers

should provide all necessary trainings to the rural tradesmen involved in construction industry in order to improve their knowledge, construction qualities and workmanship. Apart from this, these centers may help to village panchayat in providing infrastructure for rural areas like roads, drainage, safe garbage disposal system, solar lighting, etc.

CONCLUSION-

Rural people are mostly unaware about the appropriate technologies and workmanship in their building construction. There is a great need to provide the inventories of materials and specifications as well as alternate technologies which they can easily adopt. The most important work is to train the manpower to make them acquainted with quality construction consciousness, problems of wrong materials and specification selections. They should understand the weightage of proper implementation of technologies, workmanship and finishing of building components. There is a great potential of R&D in the development and implementation for rural construction technologies. A system should be evolved to reach the decimation of knowledge up to grass root level in rural areas. Proper training of tradesman may certainly improve the construction quality. Construction help and guidance centre may help them in testing of soil and material, design and planning of buildings, which may improve the construction quality in a cost effective manner.

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