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Spatial Analysis of Affordable Houses In India

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Abstract **-** *According to the economic conditions and population prevailing in India, there exist a huge demand for low cost and affordable housing. The technical group in association with MHUPA (Ministry of housing and urban poverty Alleviation) arrived in a conclusion based on their survey; at the end of India's tenth five year plan, the housing shortage will be approximately 24.71 million for 66.30 million households.(88% for EconomicalyWeakerSection,11% for Lower Income Group ,and rest for Middle Income Group and High Income Group).[1]Affordable housing offers all basic amenities and facilities with quality, better construction but at a price point that is affordable by any income group. Therefore, affordable housing come across all income groups of the society. The housing cost is a guideline for affordable housing which do not exceed 30% of a household's gross income. However India uses a 40% rule. Certain factors that force us to think of affordable housing are increasing population, rapid urbanization, and demand supply mismatch.[1] Even though affordable housing schemes prevail in the country, it does not reach in the hands of the needy. My overall aim of my research is to examine the affordable housing for LIG and MIG and who really wants it.Case studies and literature studies were conducted based on parameters such as spatial quality cost and materials. Therefore, in this study the major factors that are examined are; the affordability of each income group and how the infrastructure can be provided accordingly. As a conclusion it is desired to develop certain strategies for affordable housing for above mentioned income groups. Live case studies and literature case studies lead to a certain set of strategies suitable for middle and low income housing which were likely to be concluded through their analysis and inference.*

Key Words: LIG, MIG, affordability , spatial analysis

1. INTRODUCTION

The World Bank and United Nations recommended a 'median multiple' indicator which rates affordability of housing by dividing the median house price by gross annual median house hold income.[2] Affordability is commonly measured community wide by number of house that a household with a particular amount percentage of median income can afford. For example the median household (the wealthier half of households) could officially afford the median housing option, while those poorer than the median income could not afford the median house. 50% affordability for the median house indicates a balanced market. [2].Determining the housing affordability is a complex and the commonly used housing-expenditure-to-income-ratio tool has been challenged. Affordable housing offers all basic amenities and facilities with quality, better construction but at a price point that is affordable by any income group. Therefore, affordable housing come across all income groups of the society.[4]. The housing cost is a guideline for affordable housing which do not exceed 30% of a household's gross income. However India uses a 40% rule.

2. LITERATURE STUDY-ARANYA HOUSING PROJECT

Project Name :Aranya Low Cost Housing
Location : Indore , India
Architect :Vastushilpa Consultants
Project Types: Multifamily , Affordable Housing
Project Scope :New Construction
Year Completed :1989
Awards: The Pritzker Architecture Prize[7]

The Indore housing in India, designed by B. V. Doshi in 1982, represents in many ways a 'classic' architectural approach to large scale, comprising about 7000 housing units predominantly, low-cost dwellings for the economically weaker sector(EWS).[3]They believed that the mere provision of well-designed and well-built habitat does not necessarily generate a stable and active community with the capacity and the means to grow. Beyond the provisions of the habitat, many governmental and private agencies have to contribute to provide an environment of financial security which motivates the project population to take root. A full spectrum of spaces and inbuilt spaces has to be provided for training facilities, material bank, workshops and light industrial units.

Fig -1: view of dwelling unit

Fig -2: aranya low cost housing

The site, roughly rectangular in plan, is situated on the Bombay-Agra NH, approximately 6 kilometers north of Indore city. About 6 acres of the total area of 220 acres have been set aside to include the small pockets of existing industries.[3] Around 6,500 plots are provided ranging in size from 35 square meters for EWS housing to 457 square metres for high income groups, as well as larger plots for multi-storey flats. Of the 6,500 plots, 65% are allocated to the EWS category. A fully serviced plot is allocated to each EWS household together with the basic building core (i.e. w.c., wash and kitchen) which can be extended by the occupants at their own pace and with their own resources.

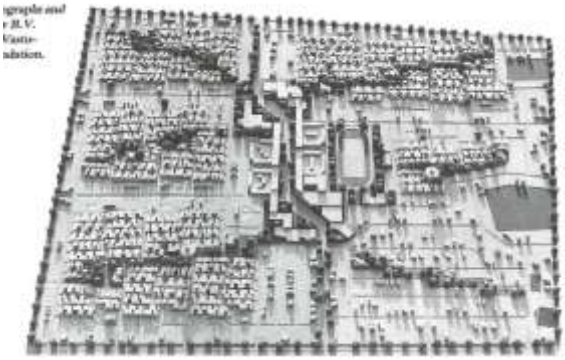

Fig -3: master plan

The objective of the scheme was to provide housing, community and commercial socially balanced matrix of middle and higher income groups. Bearing in mind the low level of affordability of the EWS families, the project assumes challenging dimensions in terms of providing an adequate environment at nominal cost.

Planning of the Service

Core In any 'site and service' scheme the service cores (wc, wash, kitchen) form nuclei around which the houses grow and the communities eventually develop. Insensitivity to the social and physical needs of the people in this respect can condemn the whole community to an unpleasant future.

2.1 Planning of the EWS Dwelling

Often In the designing of a new township, the program often commences at the master plan level and come down to individual dwelling units. Here The clusters and the dwellings units are locked into the format as residues. To avoid this, dwelling plans and elevations have been prepared alongside the master plan to be fused into the whole. The emphasis has been on the creation of inviting comfortable homes in harmony with the surroundings.

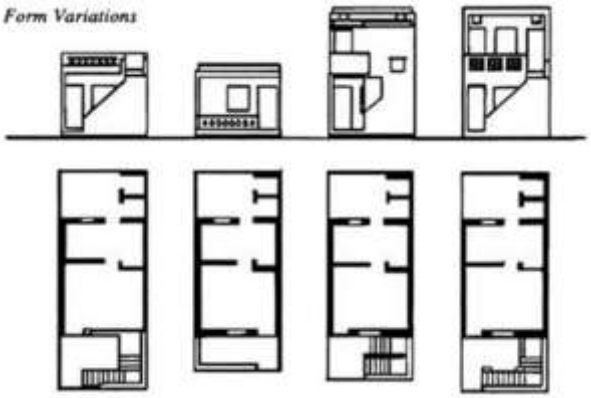

Fig -4: dwelling unit

Between the street and house, a transition zone was provided. Platforms, porches, and open stairs were built which created an interesting street character**.** A verandah or house extension helped in expanding the small EWS houses and enhanced the space quality.

Fig -5: view of dwelling unit

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Fig -6: plinth constructed for EWS

3. LIVE CASE STUDY

3.1 Karimadam Colony

Project name: BSUP Kari madam colony
Conceptual design : Laurie baker
Initiation: Jawaharlal Nehru national urban renewal mission
Project execution : COSTFORD
Nodal agency: kudumbasree
Site area : 9.3 acres
Houses per block : 20
Population:2341 residents 632 families

Karimadom colony is situated in the heart of Trivandrum, near well-known chala market. This zone encases the sewage collection pond of the entire city, owned by kerala waer authority. Over time, people moved to different places encroached the zone around the pond and the locality gradually urbanized into a slum. The renovation of karimadom colony is a classic case of cost effective housing for the urban poor .this belongs to basic services to the urban poor project by Trivandrum municipal corporation. This project is an initiation by Jawaharlal Nehru national urban renewal mission.

The major occupation of the people in the colony is in the chalai market ad in east fort as labourers. Some people have their settlements on the road sides have extended their houses to make a small shop. Most residents are dependent on their day wages. The people in the colon have direct access to all the necessary facilities like hospitals shops bus stand, schools, colleges, etc. In a short walk able distance. Therefore the people have no intension of leaving the place. From land use analysis it is clear that the area around the colony is surrounded by both average and above average people. The people in the colonies depend on these houses for their livelihood to a small extend. Some work in these homes for money. The mere views of the people sending their children to school create an urge in the minds of these people in colony to also sent their children for good education.

Due to these strong contextual influences rehabilitation cannot be done. What needs to be done is redevelopment.

The project requirements were based on the following goals

- 560 households
- Interactive community spaces
- Health centre, anganwadis and study centers
- Work centers for kudumbasree

Fig -7: ground floor plan

Out of 9.73 acres, 6.12 acres is the building area
The number of housing units to be provided is 560 with average size 40 sqm.

Total area required, if built as separate units=22400sqm
The possible housing typology: vertical stacking.

Fig -8: block elevation

Unit typology

- Well packed arrangement of units
- No space wastage
- Individual terrace of units for future expansion
- Jally works open to the central passage
- Utilization of space below staircase as storage space.

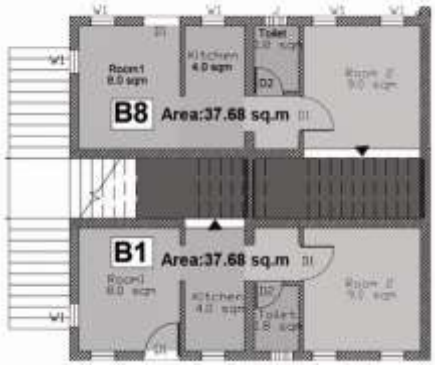

Fig -9: individual unit plan

Pitched roofs

Pitched roofs are used as they provide effective shading and adsorb less heat. A hollow arrangement of brick-on-edge, filled with one or two steel rods in concrete carries the load of wall and roof above effectively. This type of lintel costs less than half the cost of an orthodox reinforced concrete lintel

Load bearing structure

The walls have been built in flemish bond which confirms to the is code specifications for earthquake zone 3.

Sloping roof

Sloping roof protect walls from getting damp and from absorbing heat. Windows have been replaced with jallies which are cheaper and give permanent ventilation, light and security. Walls have been unplastered so as to expose the true characteristics of brick. This reduces the cost of the building by 10%.

Modifications and physical changes by the inhabitants

- The spaces are effectively utilized by inhabitants.
- Living rooms are converted into bedrooms
- Space below staircases are utilized

Fig -10: modifications and changes

3.2 MIG House at Pallimukku

Since the there are two floors, number of rooms are increased. Separate living area and sit out is provided. Dining area is provided along with living area. seperate work area is provided next to the kitchen.one of the landing of stairs is extended and used as Pooja room. Filler slabs, jack arch, brick jallies and exposed bricks are used.

Fig -11: puja room

Fig -12: exposed bricks and filler slabs

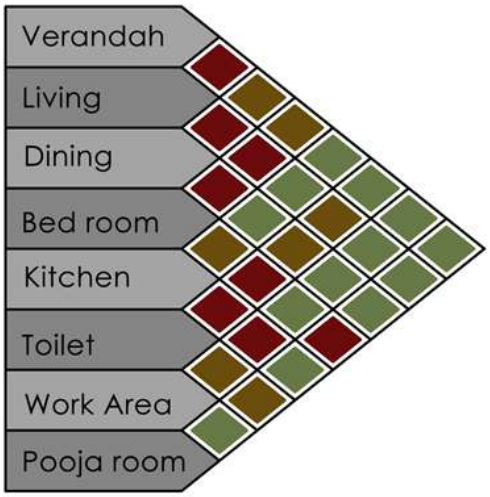

Fig -13 : proximity

3.2 M Home

M home is a low cost greenhouse prototype by Ar.N Mahesh. It has a plinth area of about 440 sqft.and the total land area is 1.85 cents with sit out and verandah. The materials used in the prototype are Ferro cement for walls.Unlike other low cost houses, it have two bed rooms with an approximate area of 6.5 sqm.it also had a work area along with kitchen. Living and dining room are combined together. A common toilet having area 2.6sqm is kept nearby with two adjacent bedrooms. Therefore toilet can be common to bed rooms and living room. Both bed rooms have an area of 6.2sqm.Kitchen can be accessed from living room directly. Kitchen having 5.4sqm area is provided with a work area of 2.7sqm .work ara has a mori(pot wash area) and a rack for keeping utensils. Other than this it had a bio gas yard where septic tank is also allocated. The house has a sit out with a masonry bench outside. Walls are constructed using gypsum blocks.

Fig -14 : plan-M Home

Proximity

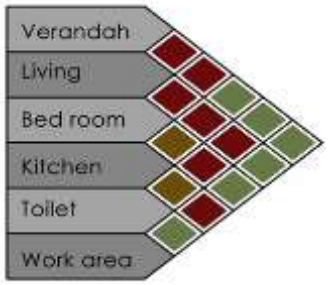

Fig -15: Proximity

4. ANALYSIS

According to the analysis it is noted that the cost and spatial quality of a particular house is highly related to the affordability

4.1 Spatial Analysis

Aranya Housing

- Rooms -1
- LIG units have one room while MIG units have one or two rooms
- Appr 8-8.5sqm
- Hall-may or may not have a hall
- Hall in MIG units-15sqm
- Toilet-1.2sqm
- Kitchen-7sqm
- Reinforced concrete plinth beams, load bearing brick walls, reinforced concrete slabs
- Foundation: Under rimmed piles in concrete
- Total cost : 100000 Rs

Karimadom Colony

- Rooms- two rooms
- Eventhough one of them is living room it is used as an additional bed room
- Approax 8-9sqm
- Living room and bed room have almost same dimensions
- Toilet-1.8sqm
- Kitchen-4sqm
- Pitched roof
- Load bearing structures-the walls have been built in flemish bond which confirms to the is code specifications for earthquake zone 3
- Sloping roofs
- Filler slab-in filler slabs, rcc slabs replaces some of the reduntant concrete with mangalore tiles inorder to reduce the overall cost of the slab. This reduces the cost by about 30 or 35%.
- Total cost:170000 Rs

MIG House at Pallimukku

- Rooms-3 rooms
- Since there are two floors number of rooms are increased
- Appr-8-8.5sqm
- Separate living area and sitout is provided
- Dining area is along with living area
- Toilet-2.4sqm
- Kitchen-9sqm
- Separate work area is provided
- One of the landing of stairs is extended and used as Pooja room(space to worship)
- Filler slab
- Jack arch
- Brick jallies
- Exposed bricks
- Total cost: 120000 Rs

4.2 Proximity

The detailed study on proximity shows a fluctuation in placement of kitchen and living room.In most of the cases dining and living are merged together.but in other certain cases the placement of bed room come in between the living room and kitchen which is in convenient.

4.1 Spatial Connectivity

Spatial connectivity is another important factor that enhances spatial quality of a space. It is related with the living conditions and spatial structuring. Certain houses even with minimal spatial conditions have a better inter connectivity with spaces. This factor enhances the living conditions even though if it is a low cost compact house. Spatial connectivity refers to the interconnection between the spaces in a house. Certain houses (say dining living and kitchen) must have an inter connection as these are the semipublic spaces. How cost is related with spatial connectivity is that since almost all low cost construction aim on minimum expenditure, they compromise C spatial connectivity plan considering the increase causing in the money due to the planning correction. Thus houses tend to have poor interconnectivity.

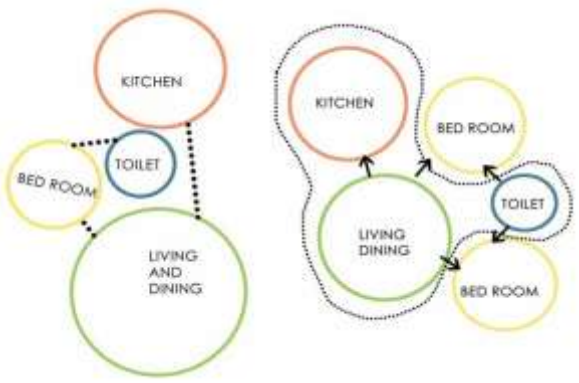

Fig -16 : spatial connectivity for LIG and MIG house

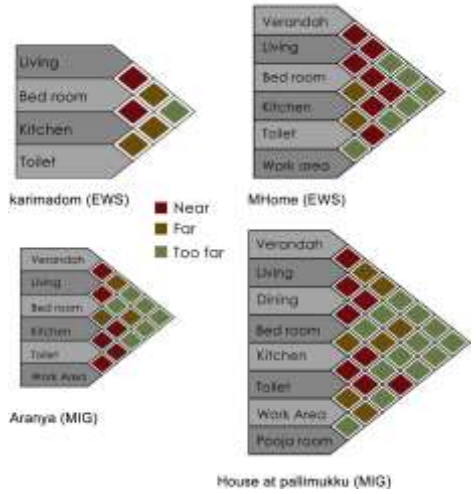

Fig -17: Proximity

Above illustration shows the spatial quality of two case studies. Even though in first case(house of mr.unnikrishnan-figure1) the cost and land availability was much more than the other case which was a completely low cost housing prototype. Even though the low cost housing prototype is constructed on a minimal area .

5. CONCLUSIONS

5.1 User group

Based on the case studies and literature studies and the detailed analysis study, certain parameters can be obtained for the housing in lower and middle income group. It shows huge dissimilarities in layout, function, materials, cost and area

Another important conclusion arrived is that other than low income and middle income communities, there exist, or can exist another community, which comes in between these two groups. They can be listed as

- low middle income group (LMIG) and
- high middle income group(HMIG)

5.2 Spatial quality

Certain strategies can be practised inorder to increase the spatial quality of a house whether it is LIG or MIG without compromising the affordability. Spatial quality can be enhanced by enhancing certain factors:

- Spatial quantity
- Circulation
- verticality

5.3 Circulation

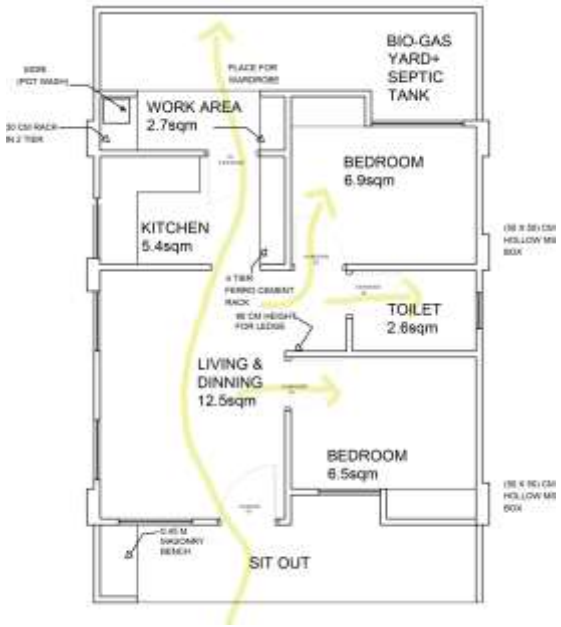

Fig -18: circulation in EWS housing

Circulation and spatial quality are mutually inter related. Houses with better spatial quality also shows better circulation. Mostly the problem with circulation takes place when there is a need to give common toilet between living and bed room. But in low cost housing the circulation flow shows to be fine, while inn certain middle income houses, since there exist passage ways, stairs etc, the flow somehow interrupts. But this problem gets neglected comparing to the spatial quantity and quality.

5.4 Verticality

In order to increase the number of rooms which increase the overall cost and ground floor area, verticality can be introduced in these type of housing. But adding up one more floor even increase the cost. Therefore inorder to increase any space (say bed room) the particular activity can be given vertically (for example, a bunk bed above the living room)

Verticality not only increase the number of rooms but a very neutral air flow can also be achieved through this. Often LIG houses are compromised on ventilation and air flow. But in this case, increasing height can provide better ventilation. Also, jallies can be provided

Fig -19: Proximity

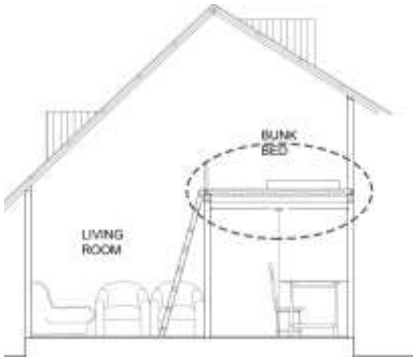

Fig -20: bunk bed showing verticality

5.5 Optimizing housing solutions

- Optimal space designing should be done with minimum circulation and better efficiency.
- While designing individual buildings, layouts and clusters, economy should be considered.
- While preparing the specifications, cost effective construction systems should be adopted.
- Orientation, built–form, openings & materials play a vital role in attaining energy efficiency, especially in developing countries.
- To develop an effective mechanism for providing appropriate technology based shelter particularly to the vulnerable group and economically weaker section.[6]
- For speedier construction, better quality components, cost reduction & to save material quantities, concept of prefabrication has been adopted.

5.6 Importance of location

The location of affordable housing and its distribution throughout the city is important for several reasons. Geographic concentrations of affordable housing may lead to unequal access to services and economic opportunities. A high proportion of affordable housing units in an area can also contribute to a cycle of disinvestment characterized by falling home values municipal services. These concentrations of affordable housing units are also vulnerable to the occasional unintended consequences of revitalization efforts, such as increased rents and property values (sometimes called gentrification), which significantly decreases the stock of affordable housing in a particular area in one fell swoop. In contrast, mixed income neighborhoods have been shown to be beneficial to a community and its residents. Researchers have found that low-income households who moved to census tracts with, loss of household wealth, and dwindling tax bases for schools and low poverty rates had improved academic achievement and increased parental involvement in school activities.

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