In-situ Redevelopment for Slum Rehabilitation in Kolkata

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ABSTRACT

For many decades, the government in Kolkata has taken up slum rehabilitation programmes that either deals with provision of common services in existing slums or relocation of slum-dwellers in multi-storey buildings off-site. However, the rehabilitation programme has not been found fully successful. Many families illegally sold their new accommodations and settled again in a slum area. Many are unhappy for being located away from their work place and face difficulty of movement and maintenance in a multi-storey block. In this study, the authors explore the possibility of redevelopment of slums in-situ that better responds to the needs and desires of the slum dwellers as well as change the image of settlements of urban poor in line with a better urban image of a city in India in 21st century.
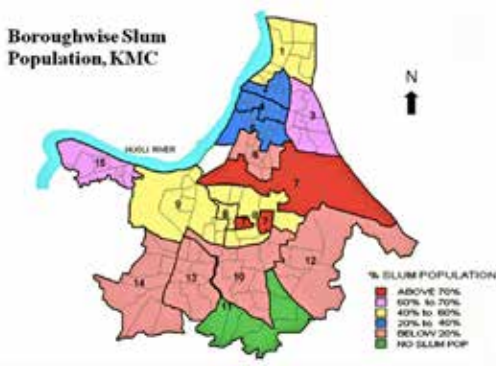
Figure 1: Percentage of slum population in KMC area (Source: KMC, 2012)

Figure 2: Co-existence of slum and modern buildings in Kolkata

Introduction

Kolkata, previously Calcutta, is the capital of State West Bengal. As per the 2011 Census of India, about 16.79% of the urban area of 185 sq. km. under the Kolkata Municipal Corporation (KMC) has been slum area with 37.89% of total population of the city living in these slums (Census 2011). As per Census 2001, 32.55% of the total population of KMC area lived in slums (Census 2001). As of 2003, 2,011 registered slums and 3,500 unregistered squatter-slums were there in KMC area (Kundu, 2003). A recent survey shows that some of the Wards like Ward No. 6 (Cossipore, Chitpur), Ward No. 29 (Narkeldanga), Ward No. 58 (Tangra, Tiljala), Ward No. 134 (Garden Reach, Port), and Ward No. 137 (Metiabruz) have slum populations in the proportion of 82.08%, 98.80%, 99.98%, 97.85% and 98.35% respectively of the total populations of those Wards (Firdos, 2008) **(Figure 1)**.

Government of India launched Jawaharlal Nehru National Urban Renewal Mission (JNNURM) for an integrated and focused development of cities and towns in the year 2005. Along with infrastructure development,

it also provided for affordable housing and basic amenities to the urban poor through the Integrated Housing & Slum Development Programme (IHSDP). Ministry of Housing and Urban Alleviation formulated the National Urban Housing & Habitat Policy, 2007 (NUHHP-2007) which primarily aimed at providing a framework for provision of housing and basic infrastructure facilities to economically weaker section (EWS)/ low income groups (LIG) at an affordable cost (NBO, 2011). The Rajiv Awas Yojana (RAY) launched in 2009 for the slum-dwellers and urban poor, aimed at ushering in a 'Slum-free India' by encouraging States/ Union Territories to tackle the problem of slums in a definitive manner (Gronchi et al., 2015).

The strategy of the government regarding slum rehabilitation programmes has included two approaches – either service system augmentation at the existing slums by providing community water supply, common service privy, pathway paving, street lighting, garbage dumping point, etc for minimum facility for dwellers in existing slums; or

rehabilitation of slum-dwelling families in relocated three-to-five storied apartment buildings. Rehabilitation in apartment buildings has also an objective to clear the site off the existing slum and acquire the land by government for urban development. While service upgrade in slums has been accepted by the dwellers, the rehabilitation programme has not been fully successful as many families have illegally sold their new accommodations to others and settled again in a slum area or are unhappy for being located away from their work place and for difficulty in their movement in a multi-storied building with problems of maintenance. However, presence of slum settlements dotting in the city in cohabitation with the modern high-rise buildings make a contrast in the emerging urban image of Kolkata **(Figure 2**). While the Government of India wants the cities to become 'Smart' and 'Digital' and urban planning in cities is being oriented towards fulfilling that objective, such slum settlements with poor structures appear in need of 'Redevelopment' in a new mode with modern architectural and technological solution in-situ for merging in essence with the changing urban image yet improving the living conditions of inhabitants.

Objectives and Methodology of Research

This research primarily aims to design an architectural cluster-housing in-situ at an existing slum area with the following objectives: providing accommodation for nearly the existing number of families residing there preventing gentrification of the slum, satisfaction of families regarding optimum spatial and functional requirements in new housing units, providing possibility for incorporation of individual scopes and

preferences in the personification of the habitable units, creation of community spaces, and creation of a housing that stands good for a positive urban image in Kolkata.

The methodology of this research included – exploration of published documents through literature review; extensive field survey at a number of slums in Kolkata with documentation of existing architectural spaces and structures; interviews of slum-dwellers on the basis of a designated questionnaire to understand their views, problems, aspirations and suggestions; analysis of findings and surveyed data; preparation of a draft architectural design of cluster-housing based on the result of research; and modification for the desired proposed architectural solution that suits the objectives most.

An Overview of Problems in Slums

A number of slums in Kolkata are not registered by the municipality, which prevent the residents, mostly migrants from neighbouring districts and states who work as rickshaw pullers, domestic help or daily-wage labourers, from getting legal identity papers. Many who have been living in these slums for 30-35 years are not recognized by the local administration and are denied services

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and rights as citizens. These unregistered slums are located on land that belongs to the public works department, railways or Kolkata

Figure 3: Slum along a railway track

Port Trust (**Figure 3**), which means that its residents are constantly threatened with eviction. Ironically, when evicted, they cannot claim rehabilitation as they do not have any documents as proof of address.

The poverty prevalent in slums, coupled with the eviction threats, have a number of social impacts. Children as young as 5 years are made to drop out of school and work to supplement the family income. The first is seen in the field of education. As slums are often seen as breeding ground for crime and disease and are looked down upon by society with contempt, schools often refuse to enrol children from unregistered slums, and flout the 'Right to Education Act' which mandates free admission, books, dresses and other school infrastructure. Gender inequality becomes more pronounced due to poverty. In addition to being denied education, girls are burdened with household chores such as washing utensils and clothes, collecting water, cooking meals, and looking after their siblings, which often takes as long as 10-12 hours a day. A number of the women work as domestic help, rag-pickers, petty vendors, etc. but have no authority to take decisions about their family or about their lives.

The general problems observed in slums are discussed further here.

Cramped Living Quarters
In any given slum in Kolkata, the average household consist of five to thirteen individuals, living in one room and sleeping on bunk beds stacked one on top of the other. The room size can vary from 7 sq. m. to 15 sq. m. Congestion factor is high as in the majority of cases, married couples have to share the room with others but can't afford to have any partitions for privacy. Students are constantly bothered by noise as there is no separate place for them to study in peace. There is little to no storage space, inadequate ventilation and the size of the dwelling unit makes it unfit for human habitation (Gronchi et al., 2015; Julfikar Ali, 2015).

Poor Construction
Most houses have either 125 mm thick brick wall or bamboo wall, with bamboo or wooden rafters covered with tin or tarpaulin sheets. The tarpaulin sheets are precariously held in place by weighing them down using deflated bicycle tyres. The floors are done with plain cement concrete with IPS top finish. Intermediate floor decks are supported by a bamboo framework topped by plywood. In some areas, where two storied structures are common (such as Babubagan Rail Colony near Dhakuria station), the intermediate floor slab is made of reinforced cement concrete.

Lack of Services
There are no basic services within the house. There is no individual water connection or toilet facilities for any household. There is community water supply at the rate of one stand-point (water tap) for one hundred slum

Figure 4: Narrow lanes of a slum

Figure 5: Interior of a slum-unit

dwellers. Water is stored in buckets and tubs, which if left uncovered can collect dirt and breed mosquitoes. Most households use common toilets provided by the municipality within the slum area or use public toilets available in the nearby areas. Children often practice open defecation. In some slums, each toilet is shared by more than fifteen families. Cooking is done using makeshift ovens (*chulhas*) or small stoves, with kerosene or dried coconut fibres used as fuel (Gronchi et al., 2015). Most people cook in one small corner of the house, or right outside the rooms they occupy, and the smoke generated by a large number of people cooking in close proximity to one another causes physical discomfort in the form of coughing, irritation in the eyes, breathing difficulty etc. In many slums there is no electricity. In slums where electricity is available, it can only be used to run one light, one fan and a TV per household (Gronchi et al., 2015).

Narrow Lanes

Units in a slum settlement are connected by narrow lanes (1.5 m or less), most of which are not kept clean and are used by

slum dweller to carry out daily activities like washing, bathing, drying clothes, cooking, parking of bicycles and so on (Figure 4). The lanes are also used as a communal space in

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the absence of other suitable alternatives. Not only does this plethora of activities inhibit pedestrian movement, but they are also unhygienic due to accumulation of garbage. In general, they remain an eyesore and contribute to the negative perception of slum dwellers in the city.

Risk of Fire

Over the years, slums have been the sites of many outbreaks of fire. The materials with which the units are constructed and narrow lanes make the slums susceptible to fire damage (**Figure 5**). For example, in December of 2012, the explosion of several gas cylinders in Dum Dum Park's Harichand Palli resulted in a fire which was doused with great

Figure 6: Dilapidated condition of a slum rehabilitation building at Chetla

difficulty as fire tenders could not navigate the narrow roads (Chakraborty, 2015). In the year 2007, a devastating fire gutted 210 houses within 15 minutes at Dhopipara slum

> **Redevelopment projects in which the attempt was to improve the existing environmental conditions of slums without relocating the inhabitants from skipping a crucial stage in the redevelopment process – establishing a dialogue with the inhabitants.**

near Ultadanga. In January 2010, a fire gutted the entire slum along the railway track at Ultadanga (Gronchi et al., 2015).

Slum Rehabilitation Projects in Kolkata

So far, the policy of the local government centred on rehabilitation of slum dwellers in multi-storey buildings at an alternative location has not been fully successful (**Figure 6**). Slum dwellers themselves have stated the reasons behind their refusal to stay at government-provided housing off-site as: increased distance from workplace, inability to adjust in new accommodation above

the first floor, and financial benefit of selling or renting out new apartment.

Redevelopment projects in which the attempt was to improve the existing environmental conditions of slums without relocating the inhabitants have also been planned and executed, but they suffer from skipping a crucial stage in the redevelopment process – establishing a dialogue with the inhabitants themselves, taking their opinions into consideration and inviting their inputs into the process. For example, at Bibi Bagan Lane, a slum just opposite to Topsia Pilkhana, which underwent redevelopment under the Kolkata Environmental Improvement Program, most slum dwellers were unaware that any work had taken place at all. They were found to be confused whether the works were done by KEIP or KMC or by other government organizations. The major problem of the residents of the Bibi Bagan is that they have the problem of the overflowing of the KEIP toilets and also that the ladies feel that the number of toilets is inadequate for the present slum population. The slum dwellers have complained about the less availability of tap waters in the area which is a major problem for the people residing here (Ghosh, 2013).

Research findings from fieldwork and interviews with slum-dwellers

For our study, we conducted fieldwork and interviews in the following slums in Kolkata:

• Babubagan Rail Colony, Dhakuria
• Unity Colony, Barasat
• Purba Panchanangram, Tiljala (near EM Bypass)
• Jadavpur Rail Colony, Kamarpara
• Slum near Utladanga Station

Item of observation	Average of observation	Percentage of total observed	Drawbacks
Number of rooms	1	67.5%	- No privacy - Smoke from cooking
Floor area (Sq. M.)	10.67	> 70%	Not adequate
Number of floors/levels	1	64%	- Vertical space not utilized efficiently - Older slum dwellers (aged 50 or more) find it difficult to climb to upper level.
Ceiling height (at highest point) (M)	2.278	65%	-Inadequate -Lack of light and ventilation
Roof material	Tiles on bamboo framework	71%	- Poor construction causing leakages - Not fire-resistant
Wall material	1. Bamboo panels on bamboo frame 2. Tin panels on bamboo frame 3. Brick	60% 22% 18%	Not fire resistant Poorly fire resistant Thicker material
Doors and windows material	Tin sheet on timber frame	40%	Poorly made
Water supply	Common tap	100%	- Improper storage can casing breeding of mosquitoes - Aged and women disliked carrying buckets of water over even short distances
Cost of construction of one slum-unit	Rs.35000 (Average of total responses on cost of building the existing hutment.)	–	All slum dwellers reported they found the cost-to-benefit ratio to be too high, as the house they got lacked basic services, and was unsafe.
Material incurring maximum cost	Bamboo	63.33%	Not applicable.

Table 1: Typology of typical slum unit (Source: Authors)

A total of 120 persons representing their respective families from the five slum areas mentioned above were interviewed with a pre-designed questionnaire. The interviews were focused on exploring the existing condition of the slum-units, determining the obstacles in the daily lives of the slum dwellers, and understanding their needs and aspirations.

Table- 1 summarises some relevant information about the existing typical slum house typology, along with the drawbacks of the design or materials.

The respondents were asked which additional facilities they would like to have in their area, and unsurprisingly, most interviewees

responded by saying that getting more bathrooms and toilets, preferably one for every household, was their first priority. A female interviewee of the slum near Ultadanga station describes the challenges of her family as well as her neighbours as: "It's a long walk to the public bathroom, and the situation is especially difficult for women. At night we have to urinate in plastic bags and wait till morning to dispose of its contents."

Many slums in Kolkata are located along railway tracks which poses additional safety risks. In Babubagan Rail Colony, the slum dwellers live on one side of the tracks and the toilets they have built (at the rate of one toilet for every sixteen dwelling units) stand on the other side, making it dangerous to use the toilets. Accidents and deaths have been reported in the area due to this problem. Besides the need for toilets, women particularly emphasized on more interaction areas in the slums, while most young (10-24 years of age) male interviewees said they wanted a playground. Parents stressed on the need for small day-care centres or playschools in the slum so that both parents can work during the day without having to worry about their children.

If a slum is built as a cluster of one-storey structures, it is nearly impossible to find space to provide these additional facilities in the slums. Vertical growth may be a possibility. A majority of those interviewed indicated their preference for ground and first floor and not beyond. Two-storey structures can therefore be considered to make free more space on ground. When asked if they could pay for new houses,

slum dwellers were willing to contribute a part of the cost. When asked how they would procure the money, over 90% of the respondents said they could pay a sum of Rs. 2000 per month in monthly instalments.

In the slum near Ultadanga station, most inhabitants moved from a nearby slum after a fire gutted their homes. "We were tenants at the slum, and were driven out after the fire. Most of us live here on rent and have to pay rent to the homeowners. As this land does not belong to us, so there is always a risk for eviction," said a male interviewee aged 35 years. At Panchanangram slum, all respondents said that they shifted to their current location after eviction from nearby slums. It appears that there is a need to give the slum dwellers collective ownership of the land they are occupying to facilitate legal and permanent housing construction for them.

Surprisingly, in spite of the less floor area, most slum inhabitants said lack of partitions or separate rooms was their major concern. "We are used to living in a small room, it's the number of people and the different activities they have that poses a problem," said a male interviewee at Unity Colony, Barasat. It is safe to conclude that while a 2.1 m. x 2.1 m. room would be considered small by most standards; it can be comfortable shared by two people living in a slum.

The visual survey helped conclude that slum dwellers were comfortable climbing ladders several times a day, as long as the aged population had some way to live on the lower level. In Babubagan Rail Colony, it was observed that the slums were arranged

as two-storey row houses, with average floor area 6 sq. m., and the upper storey was accessed using ladders only. Interviews revealed that using ladders to reach upper level within a house is acceptable as long as they get basic services and more privacy in their house.

Many homes chose to keep the kitchen near the entrance, with a flex board partition separating it from the rest of the house. Speaking of spaces one requires within the house, a female interviewee aged 25 years from Jadavpur Rail Colony said, "We would like to have a puja room. Right now we have built only a small temple in the area, but it would be preferable if fewer people had to share it." She stressed that greater proximity to the puja room and not the desire for performing puja activities alone was behind this preference. Some interviewees said that if they were given a home, they would be interested in starting small businesses.

A Case for in-situ Redevelopment

The result of the research brings about some useful guidelines for consideration in the design approach for any redevelopment project. They are summarised here.

- The slum dwellers should not be relocated elsewhere. Instead, better homes and infrastructure should be built for them on the site they are currently occupying.
- The housing modules could be small, with a floor area of less than 30 sq. m., but with enough scope for satisfying various functional needs of around five persons accommodating in each unit.
- There should be an emphasis on using only modern construction materials. The house
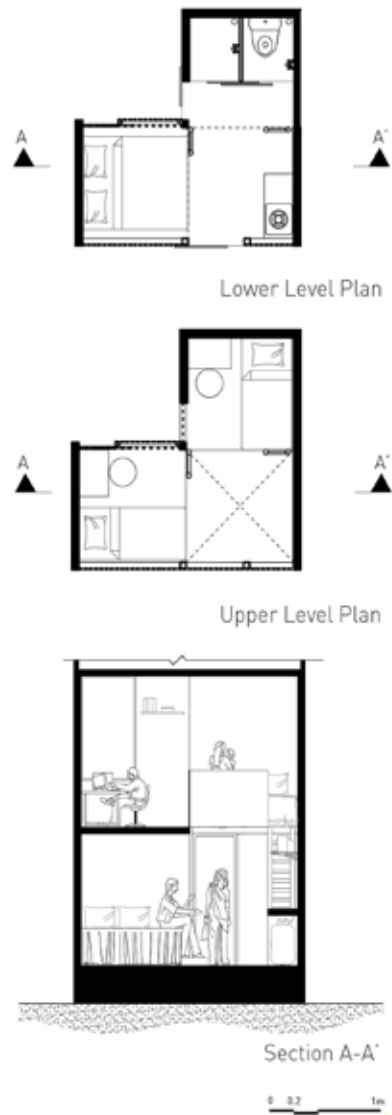

Figure 7: Plan and section of proposed unit

could be built using a steel structural frame and a modern building envelop. The idea is to build structurally strong smart modern homes that alleviate the taboo associated with slums and bring a modern visual image of housing of the urban poor in Kolkata.

Figure 8: Conceptual view of proposed unit

- There must be flexible functional areas in the housing units which can facilitate the dwellers for doing small business or craftsmanship for income generation. The housing units must have scope for expansion and give the slum dwellers freedom to design the extension.

Design Solution

The research concludes with the last stage of developing a prototype unit that could be repeated to form two-storied structures. The smallest housing unit we witnessed during the survey was in Babubagan Rail Colony, with a floor area of 1.8 m. x 3.6 m. This dimension was considered too small for comfortable living.

Therefore, we took the width of this unit- 1.8 m, as a side, to form four different squares, three of which are arranged in an L-shaped built unit (**Figure 7**). The remaining square was left vacant to act as open space. There are two levels in the prototype. The lower level has the bathroom, toilet, kitchen and a living that can also become small sleeping area. The upper level has sleeping area and workspace for two people and four if bunk beds are utilised (**Figure 8**). Ladders are used to have access to the upper levels as space-saving devices and the slum dwellers showed comfort in climbing steep ladders. Total floor area including the upper deck of one slum-unit is 16.2 sq. m. The modules are planned as steel structures with 125 mm thick brick walls and
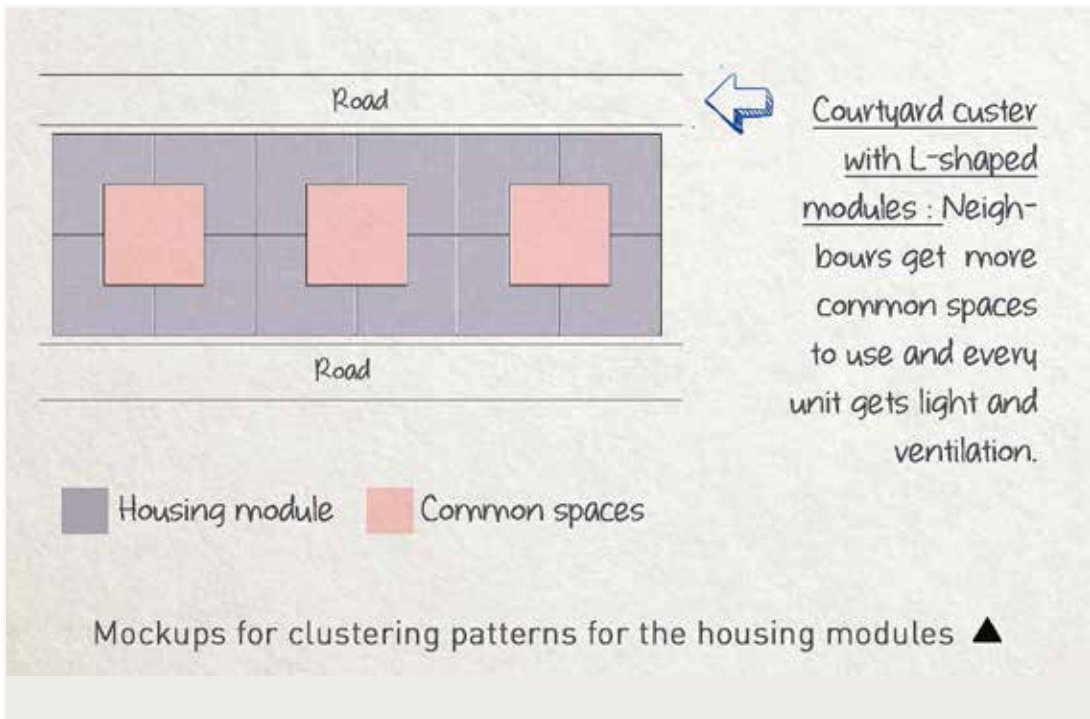
Road

Courtyard custer with L-shaped modules : Neighbours get more common spaces to use and every unit gets light and ventilation.

Road

Housing module   Common spaces

Mockups for clustering patterns for the housing modules ▲

Figure 9: Proposed site layout plan of slum-cluster

gypsum panelled interior walls and pre-cast concrete floor slabs. The roof would consist of a steel beam-framework topped by galvanized iron colour-coated sheets. The building skin is designed using a metal framework and metal louvers painted white and etched glass panels where suitable. The cost of construction of the unit is estimated as Rs.8000 per sq.m., total cost of one unit would be Rs.1,29,000. A part of this may be funded by government schemes and remaining to be paid by the households in easy instalments.

The clustering pattern for the modules has been worked out considering two factors. First, the optimisation of land use is such that the ratio of roads to the built-up units does not become too high. Secondly, since the modules are small, there

was a need for adequate shared open spaces for the slum dwellers for which, a community space in the form of a courtyard has been provided combining the L-shaped units (**Figure 9, 10**).

Conclusion

Our research, field observations and interviews show that relocation cannot be a suitable answer to the need for developing slum areas. There is a need for in-situ redevelopment of slums, and providing flexible housing units complete with services like electricity, water supply and toilets. The new housing units can be accommodated in the limited space available in the existing slum areas by utilising the vertical space of an upper floor. Therefore, two-storied stable structures are proposed. Since there is a taboo about slum areas, there

Figure 10: View of courtyard in slum-cluster

is a need for more aesthetically pleasing architecture. Also, materials prescribed for used in construction are durable and easy to assemble. Matching service systems are also to be provided. Finances can come from a

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government housing scheme. The units can be provided to the dwellers under nominal rent or leased against a micro loan. The new proposed housing would be clusters of modern buildings and adequate open spaces for family and social interaction redefining the urban image of Kolkata to the world. ∎

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