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Transformation of Slum and Squatter Settlements: A Way of Sustainable Living in Context of 21st Century Cities

Mania Tahsina Taher*, Arefeen Ibrahim*

Department of Architecture, American International University-Bangladesh, Dhaka, Bangladesh
*Corresponding author: arefeen@aiub.edu; maniataher@aiub.edu

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Abstract The Squatter settlements in many of 21st century urban cities are inevitable phenomena. Living condition in these settlements suffer from overcrowding, inadequate accommodation, limited access to clean water and sanitation, lack of proper waste disposal system and deteriorating air quality. Squatter settlements are increasingly seen by public decision-makers as 'slums of hope' rather than 'slums of despair'. There is abundant evidence of innovative solutions developed by the poor to improve their own living environments. This paper will assess the question if ideas of contemporary architecture can be implemented in providing ecological living for squatter settlements, along with a discussion on probable suggestions in relation to their daily living pattern. The paper also presents several case studies of sustainable living in high-density urban areas and slum settlements in different context, finally concludes providing some strategies and policies that might be helpful to the policy makers in providing sustainable settlement for urban squatter dwellers.

Keywords: *urban squatter, sustainable, high-density, self-help, ecological living*

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1. Introduction

A squatter settlement can generally be defined as a residential area in an urban locality inhabited by the very poor who have no access to tenured land of their own, and hence "squat" on vacant land, either private or public [1]. As these settlements are growing illegally on vacant lands, therefore, urban policies are not very active regarding the development of these areas. The simple shelters that the slum dwellers construct with the help of their rudimentary building skills can be erected and re-erected at short notice. Cities like Mumbai, Dhaka, Caracas; also Bogotá, Mexico City, Cairo, Lagos, Johannesburg are some of the examples where growth of squatters and slums are taking on such a fast pace that they are encroaching on a significant portion of the urban fabric. It is further projected that in the next 30 years, the global number of slum dwellers will increase by approximately 2 billion, if no decisive action is taken. National approaches to squatter settlements have generally shifted from negative policies (such as forced eviction, benign neglect and involuntary resettlement etc.) to more positive policies (such as, self-help and in situ upgrading, enabling and rights-based policies) [2]. In some cases, squatter settlements are not classified as urban settlements precisely because they lack services to qualify basic human needs. As a case study, 'Dharavi' located in Mumbai, India- is the largest slum in Asia. Slum dwellers make up around 60% of the population in Mumbai and while their land only takes up 6% of the city of Mumbai in Dharavi. The settlement is located in the heart of the city and therefore extremely valuable in terms of the current real estate boom. The slum spreads over an area of approximately 1175 acres, has a population density of 18,300 people per acre; this density is comparable only with Kibera, Nairobi's second largest squatter settlements, and Mexican shantytowns. There are 86,000 housing structures: typically Cramped approximately 150 sq. ft. houses each, with no natural light or ventilation, without running water or sanitation. There is one toilet here for every 150 people, with water shortages. Dharavi also faces transportation, drinking water, drainage and sewerage problems [3].

2. Causes

The characteristics associated with squatters and slums vary from place to place; slums are usually characterized by urban decay, high rates of poverty, and unemployment. They are commonly seen as "breeding grounds" for social problems such as crime, drug addiction, alcoholism, high rates of mental illness, and suicide. In many poor countries they exhibit high rates of disease due to unsanitary conditions, malnutrition, and lack of basic

health care. In spite of all these issues, people choose to live in squatter settlements for many reasons.

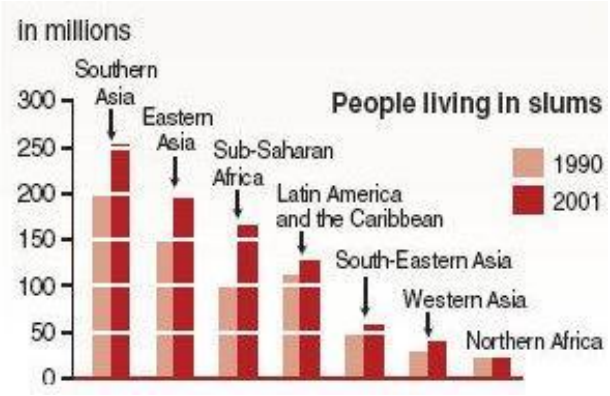

Figure 1. Graph chart on population living in slums (Source: Emmanuelle Bournay, UNEP/GRID-Arendal)

Figure 2. Dharavi slum in Mumbai, India (*Source: www.dharavi.org)*

The prime reason is the inability to afford any other type of accommodation and the freedom from rent and civic obligations. The initial structures in squatter settlement are small in size, made of low-quality materials like- polythene sheet, straws, used corrugated iron sheet etc. The simple buildings they erect accord with their rudimentary building skills can be erected, re-erected, and even expanded at short notice. "The Challenge of Slums: Global Report on Human Settlements 2003"—the largest study ever done by the United Nations Human Settlements Program (UN-Habitat)-found that urban slums were growing faster than expected. The number of people living out their days in the squalor of a slum is almost one billion; one out of every three city dwellers, a sixth of the world's population. Without radical changes, it is believed that the number could double in 30 years. By 2050, according to the report, there may be 3.5 billion slum dwellers, out of a total urban population of about 6 billion. Squatter settlements in urban areas are inevitable phenomena as long as urban areas offer economies of different scales as means for improving quality of living and environment for millions of poor in developing areas of the world. Large cities will always continue to grow- attracting migrants from rural areas mainly, and also from underdeveloped urban areas. This trend of rural-to-urban migration has led to the result of more squatting in urban regions, particularly in the last three decades. Squatter and slum settlements have formed mainly because of the inability of city governments to plan and provide affordable housing for the low-income segments of the urban population [4]. Hence, squatter and slum housing is becoming the housing solution for this low-income urban population.

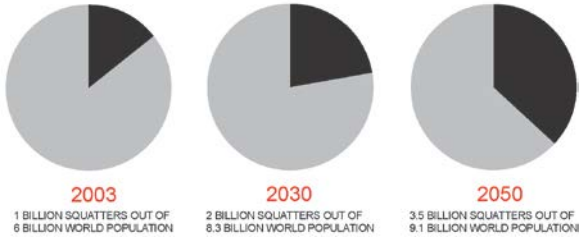

Figure 3. The graph shows the expected increase of the world's squatter population by 2050 (*Source:* UNCHS HABITAT [4])

3. Measures Already Taken

Many governments around the world have attempted to solve the problems of urban squatter settlements by clearing away old decrepit housing and replacing it with modern housing with much better sanitation. In these specific cases, slum clearance often took the form of eminent urban renewal projects, and often the former residents were prohibited in the renewed housing. According to many critics, forced slum clearances tend to ignore the social problems that cause the formation of slums.

National approaches to informal settlements in particular, have generally shifted from negative policies such as forced eviction or benign neglect recently. Approach that has been receiving considerable attention from various government and public authorities has been the "enabling" approach, where instead of taking a confrontationist attitude, governments have strived to create an enabling environment, under which people using and generating their own resources, could find unique local solutions for their housing and shelter problems.

Figure 4. Self-help housing improvement program at Yogyakarta River Basin Squatter areas, Indonesia (*Source: Yayasan Pondok Rakyat, NGO)*

These include more positive policies, such as 'self-help' and 'in situ' upgrading, enabling, rights-based policies etc. Squatter settlements are increasingly seen by public decision-makers as places of opportunity, as there is abundant evidence of innovative solutions developed by the poor to improve their own living environment. In a word, different strategies have been adopted ever since in order to improve squatter settlement conditions, like- micro credit, appropriate technology etc. As a case study, the implementation of slum and squatter improvement

programs in the river basins of Yogyakarta, Indonesia–government launched different slum improvement programs at that flood-prone squatter areas, rather than eviction of the whole living there. The programs included social rehabilitation, where the objective was to improve the settlements and cleanliness of the environment, renovating poor housings through a self-help mechanism. Program for socio-economic enhancement resulted into increasing household's income and harmonized social relationship among residents. Community venture projects resulted into improving housing quality, which also provided funds for Vocational training project aimed at increasing the youth skills, urban settlement improvement project resulted into improving physical facilities, such as-drainage, footsteps, garbage bins and public toilets within the locality. The main themes of these projects were that all these programs were strongly participated by the local residents of the squatters of Yogyakarta, which resulted into such success [5].

3.1. Self-help Housing

Figure 5. Traditional 'Chika' house built by HFHE in Ethiopia (Source: HFHE Ethiopia)

Architects and designers, under different organizations that motivated and helped these poor people in building the settlements, were involved in construction of these self-help housings, where they guided more as trainers than designers. As case study, Habitat for Humanity, an international organization established in 1976, has built more than 300,000 houses, sheltering more than 1.5 million people in more than 3,000 communities worldwide, and they have motivated low-income people to build communities on self-help method [6]. Many architects and designers work under this organization, holding voluntary role in construction of self-help housing in different regions. Habitat for Humanity Ethiopia (HFHE) began construction in 1993 near the city capital Addis Ababa and has since expanded to build houses in 11 communities. Most houses are located in urban and semi-urban areas. Families participating in a mutual self-help project perform approximately sixty-five percent of the construction labor on each other's homes under supervision of architects. The houses built in Ethiopia are mostly traditional style 'Chika' house, 85% of these houses in Ethiopia are made of mud and stick or thatch walls, which collapse easily. Homes are often cramped, with dirt floors, leaking roofs and no windows or doors, leaving their occupants vulnerable to adverse weather conditions, insects and rodents. Poor ventilation for inside cooking fires is a common cause of respiratory problems. [7] Moreover, a staggering 90% of the population has no access to decent sanitation facilities, and 73% of the population does not have safe drinking water, causing disease to run rampant.

HFHE there constructed the settlements in 'Chika' style, from a number of different materials, including stabilized earth blocks, wood and fired bricks and all the necessity services and conditions were provided for living. Constructions of 'Chika' houses are affordable, quick and easy to build, and that was the reason to opt for this construction technique; some cost for construction was taken as loan from the organization, which is being paid in monthly affordable installations. These self-help housing programs are successful in sub-urban and rural housing areas, where people live in their own addresses. But providing self-help housing loans and construction help for urban squatter settlements, in many cases, has been a dilemma for squatters and the organizations, case studies show that.

Figure 6. Grameen Bank Housing project **(**Source: Grameen Bank Housing Bangladesh)

Taking a case study from Bangladesh, The Grameen Bank is a co-operative non-governmental association that first began a loan program for the rural poor to help them initiate income generating schemes. Then, with the success of the program, they decided to extend the bank's credit support to house-building in 1984, to build flood and water resistant modest houses. The Grameen Bank low-cost loan housing program, provides each borrower loans of approximately US$ 350 at 5% interest for basic housing scheme. Besides the money as loan, the borrower receives four concrete columns, a prefabricated sanitary slab and 26 corrugated iron roofing sheets at a much lower price. The structural system is based on a standard module, the pre-cast building materials are mass-produced off site, and the families construct the houses themselves. This housing scheme has been proven very successful in rural areas, the program is continuing with building over 30,000 new homes each year. [8] The Grameen Bank Housing Project, along with its success story of winning 'World Habitat Award' in 1998, still has no scheme for urban poor. Reason behind is, urban poor living in squatter settlements has no permanent address, liability of issuing loan on their name then comes to a question for the organization. And, on the other hand, in case of improving squatter settlements by the residents, it was found on a

survey that, residents were unlikely to invest time and capital for settlements that they don't own. As an outcome in rural areas of Bangladesh, 95.4 per cent of the rural households with homes have ownership of the property compared to a figure of 71.5 per cent in urban areas, like Dhaka, in 2001.

3.2. Security of Tenure

Security of tenure is a critical factor contributing toward people's housing processes around the world. When communities of the urban poor do not have ownership rights to their settlement, the impulse toward improvement is decreased because there is no incentive to invest in something that they will eventually have no ownership right. Secure tenure to slum dwellers transforms their homes into a tangible asset. They can leverage their house to finance their work; they can rent out rooms for income support. Investment in community improvements and urban infrastructure build value into this tangible asset while improving the productivity of home-based enterprises. But even so, securing tenure is not without its complexities and often leads to indirect eviction. For instance, the value of the tenure after development is sometimes so high that the resident is forced by its own poverty to pass it on and instead find a new informal settlement for himself. In this case, simply giving property ownership to urban or rural poor has created an increase in poverty by placing slum dwellers at the mercy of a voracious property market. Developers, with an eye toward entrepreneurial development, tempt the owner to resell or rent the new property. As a result, the owner sells the tenure which they received as a 'gift', then go back to live in slum again. One of the main goals to improve living for urban squatters should be, to create tenure situations that work for communities without subjecting them to increased market forces. For instance, slum settlements in Sao paolo, Brazil are called 'Favelas', more than 50% of people living in these settlements are self-employed informal workers, who $500 on average per month. A housing development project named 'Cingapura' took place in some favelas during 1990's, targeting these lower-income households. The concept was simple: rationalizing a favela by creating new-construction publicly funded housing, five or six-storey walkup flats, which are then sold to the residents who used to live there. After construction, a typical Cingapura property cost was considered affordable only for the upper-income households of favelas. Therefore, the intended beneficiaries were not helped by this housing program. The units were also considered as larger than families need, and poorly suited for self-employed informal workers living in the settlement. As a result, those who moved back to the new constructed housing project were often quite different from those that moved away [9].

4. Possible Solutions

In our opinion, to address a solution for urban squatter settlements, firstly the squatters will have to work as a community, that can co-ordinate with their development plans along with Government and other organizations. Even by looking at the formation of this kind of settlements, they are the constructive results of collective efforts of a group or community. Development and maintenance of slums calls for on-going collective organization of land development, shelter-making, obtaining basic services and ensuring social security. But, in case of improving their conditions, they have to be more organized and expanded as a group. Moreover, urban poor have to be aware and educated of their rights and how they can work along with each other, take the lead role in improving their situations. For example, regarding the complex tenure situation in urban regions, the urban squatters, formed as an organization or as a group, can seek the help of government to allot unused, vacant lands on their organization/ group's name, on the condition that, the property would be developed as housing used by the squatters themselves. Although cities often claim that, there is no land left for the poor, this is almost always untrue. When poor people learn about their own cities and educate themselves about development plans, they can challenge this fallacy.

4.1. Self-involvement in Design and Construction

The squatters can continue to play a central role in the design and construction of their homes and communities with the help of architects. Contemporary architectural practices and researches can set some design examples of low-cost ecological living settlements with basic living conditions provided (like-sanitation, water, electricity etc); these designs should be adapted to climates of different regions. The designs must fulfill the first condition of being affordable for urban squatters. Then, they should fulfill the criteria to be built in easy, traditional methods by the owners. Squatters have always been the architects, engineers and builders of their settlements, and here they can also play the role. The goal here is to use the knowledge and skills of the formal sector in complement to the skills of the informal sector- building quality houses without foreshadowing the participation of beneficiaries.

4.1.1. Self-help Housing Case Study- Dhaka

Dhaka, the capital of Bangladesh, located in South-East Asia, is one of the fastest growing mega-cities in the world, with slum populations seemingly outpacing the growth of other urban areas. In the city corporation areas, a study estimates that 35% of the population lives in slums, 43% of urban households live in poverty and 23% are considered to be extremely poor. Notwithstanding, the urban poor have been and continue to be largely excluded from national policies and urban planning processes and development plans. The vast majority of poor urban dwellers in Bangladesh cannot live without the fear of eviction; they have no social security either. But security of tenure, which means to ensure the right to have a secure home- a trigger point for helping communities develop. If households have improved security, they are willing to invest their own resources in improving their living environments, with the secondary health, social and economic benefits that follow. Land tenure security is therefore considered to be among the most important factors for reducing urban poverty in Dhaka. But due to complex land use regulation, it is almost impossible to rehabilitate slum dwellers before slum eviction. Moreover,

Dhaka city requires between 55,000-83,000 housing units each year, whereas all public and private efforts together can only produce 25,000 housing units a year. Therefore, the low- income people do not have the scope to manage housing from private/public housing sector and they are compelled to live in slums.

Figure 7. Improved water supply and sanitation system at Talab Camp, Mirpur-12, Dhaka; by Habitat for Humanity Bangladesh (HFHB) and local users (*Source: author)*

Figure 8. Existing drainage system (left picture), and, improved drainage system (right picture) at Talab Camp, Mirpur-12, Dhaka; by Habitat for Humanity Bangladesh (HFHB) and local users (*Source: author)*

Habitat for Humanity Bangladesh (HFHB), established in 1999, has served more than 6,000 poor families through building, renovating & retrofitting the houses, toilets, water sources and community facilities till now. In 2012, HFHB has initiated their first project for urban poor in Dhaka- a pilot project located at Talab Camp, Mirpur-12 area. The site had severe water logging and flooding issues, and this project directly addressed these issues by intervention of housing condition- raising the plinth height and converting mud floor into concrete floor. This improved the living condition of twenty-six poverty impacted families. The drainage system in the community was improved to avoid flooding- HFHB along with the user group cleaned 1,600 ft drain & repaired 900 ft drain with installation of slabs on the drain which is being using as walkway. They also replaced pipe drain for U-type RCC drain with slab and inspection chamber. For water supply, an underground water reservoir was constructed with tube well as a water collection point for the community. Water pipelines were replaced to ensure water flow in the reservoir. Locally available filtering devices were provided to 350 households for improving sanitation quality. One existing community toilet was renovated and overhead water reservoir with pump for running water facility was added. HFHB conducted ten appropriate training sessions for the existing 350 households people in Talab Camp where they taught about construction technology, waste management system and water drainage. Into all these activities, according to the 'Habitat for Humanity' motto, the user group took a strong role in building and improving their own settlement along with HFHB. Finally, together they were able to develop a Long Term Community Development Plan (CDP) for Talab Camp, which they named as "Building Resilience Urban Slum Settlement Project, Talab Camp, Mirpur-12".

HFHB are planning for two more pilot projects within the urban Dhaka by 2015, where the motto aims to improve the living condition and facilities of the overall settlement rather than directly helping slum people to build their dwelling units on public lands.

4.2. Creating a 'Sense of Belonging' Through Design

In most of the efforts taken to improve conditions of urban squatter settlements by architects and designers- there has been the eviction of squatters, and re-settling them in vertical, high-rise buildings. In most of the designing of these buildings as replacement for squatters, their usual living pattern had been ignored- no open space for social activities and children had been provided. Moreover, dwellers were not involved to the process of the development. As a result, no 'sense of belonging' worked for those urban squatters on those settlements. For example, both Britain and France responded to housing shortages after the Second World War by constructing low quality, high-rise blocks. The consequence of this decision is that horizontal slums were replaced by "vertical ghettos". Even today, these high rise buildings constitute a serious problem to the people who live in them, because of increased insecurity and insularity, poor quality building materials, low standards and stigmatization of those areas. In a way, these vertical ghettos are often worse than the horizontal slums of previous decades as they lack a sense of community. One of the common characteristic in slums is that these are consisted of vibrant communities of people and incorporate a whole range of social and community spaces and facilities within their living. For example, every slum has a niche; small shrine or temple, mosque or church, based on their common faith, where they meet and have social gatherings. For most of these informal activities of social interacting; children playing, shopping, chatting etc they use from the most minimal space for social interaction at the door step, the circulation and open spaces, to the optimum community spaces for various social and cultural activities. Visiting in almost all of the squatter settlements, one can find the lack of basic human living needs in these settlements, like- sanitation, drinking water, ventilation in living units, crime etc. which couldn't become a hindrance to the social living existing among them. As 'Dharavi' was mentioned earlier, in the development plan of the slum by internationally-renowned Architecture firm, Skidmore, Owings & Merrill (SOM), they plan to shift the slum by building blocks up to 14 storey high. On payment of a transfer fee, slum dwellers could become eligible for a 300-sq ft flat in Dharavi. According to Maharashtra Housing and Area Development Authority (MHADA), they plan to use 4.5 lakh sq meters of built-up area from the total available 10.5 lakh sq meters for rehabilitation of slum dwellers; the remaining area will be used to build affordable houses for outsiders, and for the total construction. MHADA also plans to incorporate the development with high-end commercial activities for the city's well-off inhabitants around the area. Designing an urban environment that equally and adequately addresses the vibrant Indian culture and commerce along with the unique social structure of slum dwellers is already a tremendous challenge for them. One of their design ideas

is to recreate a similar sense of community that is present now; the new apartment blocks will have wide corridors and communal areas that mimic the current shantytown's streets and where children can play. However, this $750 million-budgeted project faces resistance from residents who have been in their shanties for generations and doubt that SOM can improve their lot. The implementation of this project has no publication where it shares the details, based on which we can have own judgment on their design. But the question should come, are these architects playing the 'should-be' role in their design process, which would support millions of squatter residents there?

Figure 9. Post-World war II social housing in Britain (*Source: Ollie Harrop, Bartlett Park, Poplar, UK)*

Figure 10. Outline image of Dharavi slum development, Mumbai by HOK Architects (*Source:www.dharavi.org)*

4.3. Housing Solution through Design

In this point of designing high-rise settlements for urban poor, which the land value demands but contrary to their living attitudes, thoughts of Architect Laurie baker (1917-2007) could be mentioned. The architect was renowned for his initiatives in cost-effective energy-efficient architecture. In his writing, "What can we do with a slum?", and he said in answer, "*A great deal. We can "recycle" it; that is to say, we can build at the same site low-cost structures that accommodate an equal number of persons, and provide plenty of open space and other facilities.*" He suggested simple-structured housing units in stepped tiers, up to four storey, incorporated with open spaces for recreational activities and Gardens at different levels [11]. During the timeline when the article was published, contemporary architecture's practice of sustainable green buildings was not that much in vogue, but the idea of Laurie Baker holds the contemporary position from designer's point of view. Question is, on the question of re-designing squatter settlements as healthy living units in the 21st century cities, how the option of designing 'high-rise, stepped building structures with dwelling units in combination with open spaces' for squatters is being considered?

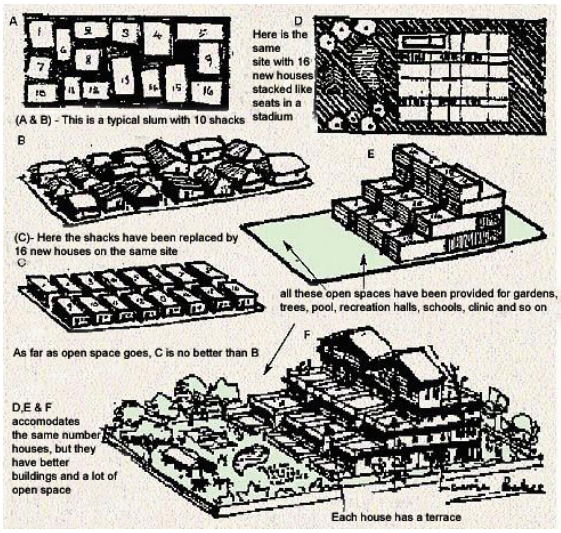

Figure 11. Architect Laurie baker's idea on "What can we do with a slum?" (*Source: THE HINDU Vol. 14 :: No. 16 :: Aug. 9-22, 1997)*

4.4. Use of Pre-fabricated Structure

In contemporary architectural practice, pre-fabrication of structures is much discussed in question of replacing regular housing units. Though the structures need to be assembled with help of experts, but they can act as a platform in solving the urban squatter problems for their advantages of cost savings for mass production, quick assembly, re-assembling in different locations and erection. Pre-fabricated housing unit has been a great help as many post-disaster shelter alternatives, as a case study we can talk of South-Asian tsunami attacks in Sri-lanka on 2005. These structures can be built as higher storey, which can arrange less ground-cover for the settlements [6].

Figure 12. Pre-fabricated structure at Tsunami affected areas in Srilanka, 2005. (*Source: Habitat for Humanity)*

5. Concluding Remarks

From all these discussions, we can say that, squatter people always face insecurity regarding the ownership of

the place where they live. But if they are provided assurance from Government organizations for actively participating into improving their settlements, the living condition into these squatters can improve rapidly. Looking at the characteristics and formation of squatter settlements all around the world, the living units in the slums are perhaps, the best examples of the most optimum utilization of living space. Moreover, the squatters use minimum building materials to create their living Space, which are easily available, like- old and used tin sheets, timber rafters, joists and posts, country tiles, plastic sheets and other recycled materials. [12] Use of traditional building materials in these settlements that are easily accessible from nature is also a character representing these dwellings. What these people mostly need in order to improve their living into sustainable settlements are- monetary help from Government, organized participation into constructing self-help housing along with local and recycling building materials, designer's participation into making the spaces more comfortable for living within the constraint of structure and space. Solving all these issues together can definitely result into sustainable housing settlement for squatters and slums. Question that comes is- can this way of living not become a typology itself, when provided with all the necessities of a healthy living? These dwellings are using optimum space and resources from nature, which is the indication of living sustainable. How can architects and designers play in these parts, converting these squatter settlements to provide as healthy living pattern, while keeping these positive characteristics intact in the renewed solution? It has been observed that, from the history of improving squatter settlements in different regions, wherever appropriate upgrading policies and healthy living designs have been put in place, have become increasingly socially cohesive; offering opportunities for security of tenure, local economic development and improvement of conditions of their lives. In 21st century living settlements around the world, when it is predicted, by 2050, two-thirds of humanity will be living in urban regions, and majority of them will be living in squatter settlements, then the question of providing adequate, healthy housing becomes a basic, emerging need for the increasing urban generations. This issue is not only about architect or designer's role in providing proper housing; this is a complex issue addressing policies, economies and politics also. So, all these different dialogues have to be merged in transforming the squatter settlements as a way of healthy living in context of 21st century. Lastly, the paper ends up with this question: Will the 21st century be remembered as golden era of sustainable, socially conscious design, by providing an overall basic healthy living pattern for all?

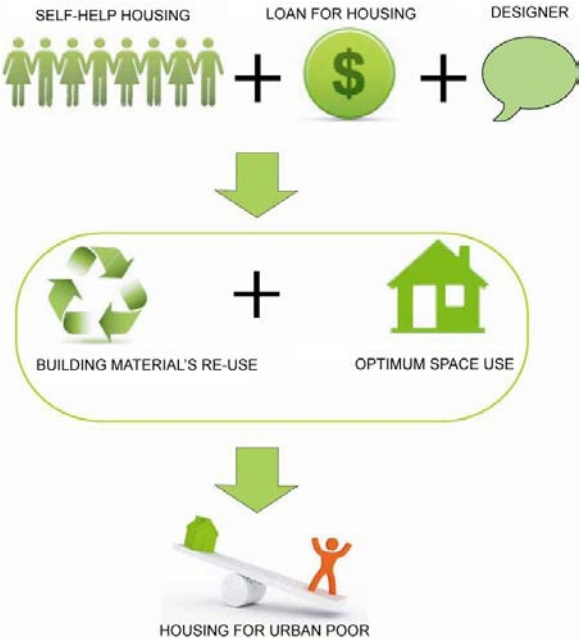

Figure 13. The diagram shows our idea of sustainable solution for transforming slums and squatter settlements into sustainable living (*Source: author)*

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