Incrementality as a method for improving the existing situation of informal settlements in developing countries

Abstract

Incrementality is a spontaneous phenomenon in informal settlements practiced by local inhabitants after the failure of formal housing supply. This paper focuses on research of incremental housing projects with design interventions to understand how can architects position themselves in this autonomy traditions but also set rules and create opportunities to promote a well-organized community for now and for the future.

Key words

Incrementality, Informality, Autonomy, Restriction, Transitional Space

Introduction to informality and self-build

In developing countries, the phenomenon of informality or self-build is a consequence that the formal housing supply fails. For example, Indonesia, with a population of over 250 million, has witnessed rapid urbanization in last few decades. However, one of the urgent problem is to provide adequate and affordable housing for millions of the urban poor. It is predicted that every year more than one million housing units should be built to meet Indonesia’s housing demand (Setiawan, 1998). Moreover, the issue of housing provision is much more complicated. On one hand, there are many supply problems in the formal housing market, on the other hand, a majority of the urban poor cannot afford to buy housing provided by either the public or the private sectors due to their low and unstable income. This condition forces them to various individual solutions including self-built houses and squatting in slums and squatter settlements (Sudarmo, 1997; Tunas and Peresthu, 2010).

In general, most of the informal settlements are constructed gradually by the residents from permanent and non-permanent materials depending largely on what the residents can afford (Tunas and Peresthu, 2010). As a result, these settlements face serious problems like high density, poor living conditions and poor infrastructure. However, it cannot be denied that this phenomenon has met the basic needs of millions of urban dwellers with the flexibility and the variety of housing arrangements, furthermore, the close social environment has also enabled new incoming migrants to adapt incrementally to urban lifestyles (Setiawan, 1998). In a word, in order to solve the formal housing problems in developing countries, besides providing more newly-built affordable housing, interventions and upgrades of existing informal settlements will also play important roles.

Incrementality as a method

Interventions in informal settlements are a subject of debate throughout the world seeking how to integrate these areas in the cities that surround them. The interventions arise from many types of possible approaches, distinguished by two opposite initial natures. One based on total demolition and complete
replacement of the area and the other in the transformation and requalification of these clusters through qualification strategies of the pre-existing. Following the last strategy emerges the Incremental Housing as a solution to a flexible intervention to the real needs of these areas. (Neves and Amado, 2014) As Neves and Amado cited from Portas and Silva Dias in the study “Incremental Housing”, the main quality of incremental housing is the capacity to build a system based on simple rules of design and execution, able to define the first phase of installation, promoting qualitative evolution of the home environment and others areas, essential to next inhabitant’s sociocultural evolution (Neves and Amado, 2014). This stresses houses grow from the initial settlements with simple types and evolutions are based on inhabitant’s changing needs and ability to continue investing.

The role of architect

As incremental constructions will have different phases, the design intervention is not static. The architects’ role is to design a framework or system that allows the interconnection of different reclaimed material around a basic infrastructure. (Roberts, 2011) In order to remove obstacles for future development, architects should set up rules to open up interactions but also restrain possibilities. Besides design responsibility, architects have more roles to play.

“As architects we can be responsible for imagining counter-spatial procedures – political and economic structures that produce new modes of interaction” (Cruz, 2013)

This requires architects should go further and deeper than their traditional roles to take more responsibilities in the design-to-construction process, not only in the space level but also in social, political and economic level to really facilitate the achievements. As architects cannot provide the financial resources necessary for certain projects, it is really important for them to think of means at the beginning about how families can improve their financial position by incremental constructions and whether organizations or governments must be engaged with to facilitate it into practice. Also, architects can help the community to acquire the basic building skills that will be needed for self-build in the future. In an active involvement, architects should position themselves in the full engagement of development and transformation of incremental housing projects

The criteria of assessing incremental housing projects

There are three aspects which need to be taken into account for one incremental housing project: social and economic aspect, spatial and typological aspect, material and technical aspect. For setting up the criteria of assessment, the latter two aspects are focused. As the social-economic aspect is the context or the input of one project, it describes the need and problems while the spatial and technical aspects mainly focus on how to solve the problems and create opportunities.

The criteria are formulated based on field research and analysis:
- Flexibility of extension
- Scale of extension
- Degree of personalization
- Reservation of transitional space
These four criteria are assessments for spatial-typological level. Flexibility and scale of extension are about the process of incremental constructions, which part can be extended and how many times bigger of the project to reach final state. Degree of personalization is about the participation of users. Transitional space is the layer between private and public, which should be reserved in the first installation as the buffer zone between houses and open spaces so that incremental constructions can happen without sacrificing collective benefits.

![Diagram of criteria in spatial level](image1.png)

- Stability of construction
- Complexity of construction
- Source of material
- Process of material

These four criteria are assessments for technical-material level. Stability and complexity of construction are about the building method that uses in particular context, is it fit or easy to carry out in the community. Source and process of material are about the suitable building material that are available on site or can be processed in the factories with better quality according to certain conditions.

![Diagram of criteria in technical level](image2.png)

**Case study 1: Aranya Low-cost Housing, Indore, India, 1989**

- Social-economic level
  The Aranya Community Housing started in 1980 in the city of Indore, with the aim of creating incremental housing for critical areas of the city. This project was financed by government with a top-down strategy. The Indore Development Authority initiated an affordable housing project for 60,000 people that would tackle this issue and at the same time be affordable to the government and urban poor.

- Spatial-typological level
  The design was approached at different levels: the township level, the community/street level and dwelling level (Ekram, 1995). This results in one of the key feature of the project: a hierarchy of open spaces that
included small courtyards to be shared by three to four families, larger green spaces for each of the settlement’s six sectors, and a central playing field to serve the entire development. Open spaces and pedestrian pathways intersect and connect the clusters to the central spine. Each user has an array of options available from one room shelters to more spacious houses. The basic rule of extension of one housing unit is stacking up from the ground floor up to two floors with different variations on plans.

- Material-technical level

Conventional and locally available building materials and construction techniques were adopted. The structures were constructed with load-bearing brick walls. Walls were plastered and painted. Floors were cement concrete. As the site had black cotton soil prone to shrinking and swelling with moisture, small diameter shallow piles with poured concrete was used, which made for very inexpensive foundation. The piles were cross connected at plinth level through concrete beams on which regular load bearing masonry walls rested. The doors, windows, and grills were made on site by the residents. (Ekram, 1995)

![Image](image.jpg)

*Fig3. Assessment of incremental constructions in Aranya Community Housing*

**Case study 2: Incremental Housing Strategy, India, 2008**

- Social-economic level

The purpose of this project was to increase the number of housing units, according to the needs of each family, respecting the organization model of the existing neighborhood, regarding the pre-existing pathways, on the integration of new constructions on the mesh already built. The project was initiated by NGO and financed 90% by the government with 10% by the families.

- Spatial-typological level

The project has three variations on the incremental housing typology with the participation of local inhabitants in the design process. Each variation uses verticality as a means to overcome ground surface shortage in the community, with two enclosed stories and one initially left open in different stories for later expansion.

- Material-technical level

The reinforced concrete structure is firstly set up, then families will help placing windows, doors, painting the house with the color they want, and placing their own floor tiles with simple building techniques based on
the material they can afford.

**Case study 3: Quinta Monroy, Chile, 2003**

- **Social-economic level**
  The task of this project is to settle 100 families of the Quinta Monroy in the same site, instead of displacing them to the periphery. However, the price of land was 3 times more than what social housing can normally afford. (ELEMENTAL, 2008) As a result, despite the fact that government financed the project, the budget was still quite tight. So ELEMENTAL found a new way of looking at the problems by identifying a set of design conditions through which a housing unit can increase its value over time without having to increase the amount of money of the current subsidy. (ELEMENTAL, 2008)

- **Spatial-typological level**
  In between the private and public space, the collective space is surrounded by about 20 families as an intermediate level of association. (ELEMENTAL, 2008) There are two dwelling types for the families, a ground floor type and a duplex type on the upper floor. The former has a floor area of 36 m² with the option to extend in the future to 72 m² and the other is 25 m² with the option to extend in the future to 75 m², the size of a middle-income Chilean family home. (Roberts, 2011)

- **Material-technical level**
  Hollow concrete blocks were used for initial constructions, later with recycled materials or bringing contractors for a better quality of finishing. Most houses have been painting bright colors, not only in the extension parts but also spreading to the existing structures.
Case study 4: Manufactured Sites, Mexico, 2005

- Social-economic level
The project locates along San Diego-Tijuana border, where mixes some of the wealthiest neighborhoods in the united states and some of the poorest communities in Mexico. In Tijuana side, there are many informal, favela-like settlements, which grow very fast and blur the distinctions between the urban, suburban and the rural. Also in this area there comes maquiladora factories, they position themselves strategically adjacent to Tijuana’s slums in order to have access to cheap labors, while they do not give anything in return to the fragile communities. The idea is to incorporate the factories, utilizing their systems, material production and prefabrication in order to produce surplus micro-infrastructure for housing. (Cruz, 2014) The introduction of prefabrication aimed at providing building component with good quality under the support of government subsidies, social organizations and factories.

- Spatial-typological level
The project explores a formal organization that breaks the generic mass of a building into a series of interstitial units and types that accommodate a variety of uses, mediating between inside and outside. The uplifted ground space is structured with lightweight steel frame acting as an extra live-work unit, providing potentials of incremental densification of one single family residence.

- Material-technical level
The main structure system is a lightweight, low-tech, prefabricated frame with all the benefits of structural stability and flexibility, also with technical possibility of accommodating available waste material that enter Tijuana continually from the other side of the border. For instance, the foundation is transformed from existing rubber tire retaining-wall system.
Conclusion

After a comparison of the above four incremental housing cases, there are some commons can be generalized, either some aspects that can be learned or some that can be further explored.

Architects should play more roles than the traditional position, not only as designer but also as facilitator, mediator or activator, which requires architects to get involved into the entire process of project
development. As Teddy Cruz declared, Architectural practice needs to engage in the reorganization of urban development systems, challenging the political and economic frameworks that benefit homogeneous, large scale, private, mega-block development. (Cruz, 2013)

In terms of design level, the key issue is the balance between autonomy and restrictions in incremental housing projects. Architects should find an approach to open up possibility but also set rules to restrain it. The prevailing strategy is to provide a supporting framework or first installation that is porous enough to allow each unit to expand within its structure but also to avoid any negative effects of self-construction on the urban environment over time. In this way, the benefits of individual housing guaranteed, however, sometimes the positive aspects of incremental constructions in public spaces are ignored. People will not stop occupying public spaces as architects designed and expected. In Quinta Monroy, some residents have constructed outbuildings adjacent to their properties which they run or rent out as shops to generate extra income. (Roberts, 2011) In order to well organize the neighborhood, the incremental constructions should also consider the possible extensions into the public spaces and reserve these spaces as a transitional layer in between public and private. If incremental constructions happen in this layer, neither the benefits of private or public will be harmed.

Most of constructions in informal settlements are carried out with materials that are cheap and easy to get and process. The above cases show how architects take advantage of what they can get to achieve quality of building constructions, especially in the case of Teddy Cruz. He introduced a new lightweight steel frame into the site with maquiladora factories around. These factories will help prefabricate the lightweight steel frame near the site thus local community (most are factory workers) can build their houses with the new building system. This is a meaningful reference showing how architect, local community and surrounding factories can cooperate to find new material and construction solutions for informal settlements.

In conclusion, incrementality is a promising approach towards the improvements of informal settlements to share the burden of formal housing supply. To find the threshold between autonomy and restriction is the key for developing incremental strategies and the transitional space in between private and public will set buffer zones for collective incremental constructions. During the process, architects should position themselves differently to the traditional roles and try to incorporate the community, the government and other organizations into the entire chain of housing project evolution.
Literature


