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The objective of W110 is to define how to create sustainable livelihoods in informal settlements through incorporating inhabitant's participation, and how stakeholders can partner with communities in the transfer of technologies to assist in the development or improvement of the settlement's physical, social and economic conditions. Detailed objectives include to investigate informal settlements that have not previously been adequately researched and present proposals for their improvement to create sustainable livelihoods incorporating people's participation, to educate and transfer technology and technical information and guidance on healthy settlements, housing and socio-economic improvements; to create conditions for technical and cultural exchange between universities and scientific institutes, NGOs or other stakeholders to communities and to create an international focal point for the collection, organisation and dissemination of research results related to enabling the provision of affordable housing and the upgrading of informal settlements worldwide. The scope of research on informal settlements and housing includes: government regulations, informal settlements and housing policies and programmes, socio-economic issues and people participation, housing design, housing delivery systems, building technology transfer and guidance, land development, site planning and housing for special need group as well as housing in disaster situations.
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Measuring Affordability and Factors Affecting Affordability of Elderly in Hong Kong

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Abstract

In many countries, people are reaching an advanced age in greater numbers and in better health than ever before. Hence, aging population is a popular demographical feature in developed countries. Elderly should be placed in a secure place to live with dignity. Affordable housing is therefore a critical factor to promote the well-being of the elderly. The discussion and debate of affordability has been triggered since the 1980s in Britain. Since then, many efforts have been put to determine who is regarded as unaffordable to housing and therefore requires government subsidies or government provision of housing. It is believed that the better the understanding on the housing affordability of the elderly, the more the Government can suggest or implement within her housing policy planning as a means of social welfare. There are three popular approaches to measuring housing affordability. They are including Normative Approach, which means an upper limit or a ratio is laid down to judge whether a household is unaffordable to housing. The second measuring approach is Behavioural Approach; it directly reviews the housing consumption behaviour of a household. The final approach is Subjective Approach; it directly asks the respondent whether he is affordable to his house or not. The result will be checked against his financial position to ensure validity. Subject to the measurement, there are four major types of factors affecting affordability, i.e. Rent, Income, Housing Related Cost, and Non Housing Cost. While the importance of these factors varies in different context, e.g. age, the factors affecting the affordability of elderly might not be the same as non-elderly. A precise understanding of elderly affordability and factors affecting the housing affordability of elderly is a necessary step to formulate a holistic housing policy for elderly. However, research findings show that some non-monetary factors for instance, age, health status, education level, and household features, exert significant influence on the level of housing
affordability. It is believed that the findings exert significant influence on the level of housing affordability. This paper would firstly present the definition of affordability and its measurement. Secondly, comments would be given to the measurement of affordability. Thirdly, factors affecting the affordability of the elderly would be identified and hence to review how it affects their affordability. Finally, a policy implication and conclusion will be given to round up the paper.

**Keywords:** housing affordability; elderly; Hong Kong
1. Aims of the study

This study focuses on the investigation of non-monetary factors to see how these factors affect one’s affordability. Based on the literature review and research gap, this research aims to base on the given definitions, investigate the non-monetary factors affecting the housing affordability and discover the interrelation between the factors. It is because, in fact, traditional perspective on housing affordability heavily focuses on monetary factors, for instance, income, asset, and rent; while for those non-monetary factors, such as household features, age, education level, are overlooked. Moreover, Hong Kong is confronting an aging population; the government could benefit from the findings of the elderly housing research to design relevant housing policy. Therefore, in this study, the elderly group is being selected as the research target population. Some recommendations will be given for policy formulation process to provide affordable/decent housing for the elderly. However, the factor of supply and modality in Hong Kong would not be covered throughout this paper in deep.

2. Introduction

Similar to other developed states and cities, Hong Kong is facing a rapid expansion of aging population. By the end of 2008, there were 1.2 millions of elderly (equivalent to 17.1% of total population) and it is the highest figure in the history of Hong Kong. It is estimated that the elderly population will reach 2.7 millions in 2036, which accounts for 32% of total population (Census and Statistics Department, 2009). The elderly dependency ratio will increase from 170 in 2008 to 456 in 20361.

The Hong Kong government is obligated to promote the well-being of elderly and so, such concern has been put on the policy agenda since its colonial era. ‘Community care’ and ‘ageing in place’ are two leading principles of elderly service in Hong Kong which means appropriate support should be provided for older people and their families to allow them to grow old with minimal disruption. Government residential care services or nursing home are the last resort to elderly. Therefore, providing affordable housing for elderly is a critical and essential step to uphold the principles of promoting the well-being of elderly in Hong Kong.

In order to provide affordable housing for elderly, it is, basically, necessary to have a deep understanding and identify what factors that will exert influence to the affordability of elderly.

3. Background of affordability

The concept of affordability was firstly arisen in Britain at the end of the 1980s. The concept of housing affordability is stimulated by the transformation of the housing market and housing subsidy system in Britain. Who is likely to be unaffordable to housing is now a crucial question to be considered by the

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1 The Elderly Dependency Ratio is calculated by the Person aged 65 or above / Person aged 15 - 64 X 1000
housing providers, especially to the government. It is because the government has her unique responsibility to provide affordable housing for those needy targets. It is indeed controversial to regard someone to be unaffordable to housing. Definition with different interpretation offers different measurement of housing affordability. From time to time, people find themselves to be ranked differently in different measurements. The first objective of this paper is to critically review the literatures on the concept of housing affordability. It aims not to construct a new approach to replace or rectify various definitions but to identify, through a comprehensive literature review, the factors affecting housing affordability.

### 3.1 Definition of affordability

The research on housing affordability has become popular since the 1980s. Prior to the 1980s, there was only limited research on housing affordability. Since then the research on affordability is increasing and at different realm, such as academia, professionals, and government, have been devoted to explore on the topic of affordability. Extensive literatures concluded many different interpretation and understanding of affordability. Howenstine may be the first one to give a definition in the notion of “affordability”. He defined housing affordability as:

> ‘The ability of the household to acquire decent accommodation by the payment of a reasonable amount of its income on shelter’ (Howenstine, 1983, p.20).

In response to Howenstine, Maclennan and William offered another more comprehensive definition to define affordability; they pinpointed the vagueness of the definition offered by Howenstine and attempted to clarify what is ‘reasonable amount’. They defined that:

> ‘Affordability is concerned with securing some given standard of housing (or different standards) at a price or rent which does not impose, in the eye of some third party (usually government) as unreasonable burden on household incomes’ (Maclennan and William, 1990; p.9).

Despite the clarification of ‘reasonable amount’, the concept of ‘given standard of housing’ and ‘unreasonable burden’ is too vague and should be defined more precisely. Bramley gave a more specific and precise definition to affordability. He mentioned that:

> ‘Household should be able to occupy housing that meets well-established (social sector) norms of adequacy (given household type and size) at a net rent which leaves them enough income to live on without falling below some poverty standard’ (Bramley, 1990; p.16).

Hancock attempted to incorporate the concept of opportunity cost to affordability. In his interpretation, affordability is strongly related to opportunity, which means something needs to be forgone in order to
obtain a house. He defined that:

‘...concerned with the notion of opportunity cost of housing, and clearly this is the essence of the concept of affordability: what has to be forgone in order to obtain housing and whether that which is forgone is reasonable or excessive in some sense’ (Hancock, 1993; p.129)

Thalmann attempted to give a summarized definition and he simplified the affordability as the comparison between housing expenditure and non housing expenditure. He wrote that:

‘Housing is not affordable for a household if it excessively crowds out other expenditure’ (Thalmann, 2003).

Local scholar also contributed to define the concept of affordability. Lau defined affordability as:

‘After paying housing costs for staying in housing unit which meets the socially accepted norms of adequate housing standard, are unable to live on a living standard of those social security recipients’ (Lau, 2001; p.1).

Although there are many different definitions of ‘affordability’ offered by different scholars and consensus are still required to be further established, common elements and considerations could be found in different definitions. Yip (1995) argues that, firstly, affordability deals with the user cost of housing of an individual household. Secondly, the household should be able to consume housing at some given lowest standard. Thirdly, the opportunity cost of non-housing consumption is an important concern of affordability. Fourthly, affordability includes the concept of merit goods. Non-housing goods and services are regarded as merit goods as many definitions state the importance to keep sufficient amount of resource for non-housing consumption; while whether housing is regarded as merit goods is still undergoing debate. Whitehead argues that the housing in UK is not merit goods (Whitehead, 1989); but Hancock contends that ‘any approach which does not taking housing to be a merit good is likely unreasonable’ (Hancock, 1993; p.129). Finally, there is a close relationship between poverty and affordability, for instance, Bramley’s definition explicitly states that ‘without falling into some poverty standard’. Yet, it is argued that affordability is not the same as poverty and a clear distinction should be made between them (Yip, 1995; p.49).

### 3.2 Measurement of affordability

To measure the extent of affordability, the concept of affordability must be operationalized. Based on the previous definition and concept, Yip (1995) suggested an excellent framework to present different measurement of affordability. The framework summarizes the measurement of affordability into three approaches. They are namely normative approach; behavioural approach and; subjective approach.
3.2.1 Normative approach

Normative approach refers to the limits or norms of housing affordability in terms of certain threshold values (Yip, 1995; p. 56). A list of benchmarks is set to distinguish whether a household is affordable to housing. There are two different types of norm set to identify the affordability. The first is ratio measurement, which means the housing cost of a household should not exceed a certain proportion of the household income.

3.2.2 Traditional ratio measurement

As ratio measurement has a long history of development, there is more than one measurement and new ratio measurement method is coined to tackle with the limitation of the old method. Traditional approach of ratio measurement is simply the same as the definition, i.e. a household is experiencing unaffordable housing if the ratio of housing cost to income, the affordability ratio, exceeds a certain threshold ratio.

3.2.3 Quality-based ratio measurement

Yet, it is criticized that the traditional approach is not comprehensive enough and the quality of housing is not being covered. Lerman and Reeder (1987) modified the traditional approach and made the approach to embrace the consideration of housing quality. Affordability is therefore defined as a household is unaffordable to housing if it must spend above a certain threshold proportion of its income on a minimally adequate house in the locality. It prevents the case that a household can only occupy a sub standard accommodation although he is spending less than the prescribed level of income. It is because more than the target ratio would need to be spent in order to raise the standard of housing to the minimally adequate level.

3.2.4 Core need measurement

Another different approach to revise the traditional ratio measurement is core need measurement, which is suggested by Sueke and colleague (1981). This approach also considers the quality aspect, but it differs with the quality based measurement. Core need assessment does not incorporate the quality aspect into the cost of acquisition at the minimally adequate quality; in contrast, the core need assessment treats housing quality as a separate dimension which includes physical quality of the dwelling as well as overcrowding. Thus, a household is regarded as unaffordable to housing, or in core housing need, if he is occupying inadequate or unsuitable housing regardless of the proportion of the household income spent on housing (Yip, 1995; p.60).

3.2.5 Residual income measurement

The second type of normative measurement refers to residual income measurement. It was firstly
developed in UK in the late 1980s. Residual income measurement means housing is affordable if, after paying housing cost, it leaves them enough income to live without falling below the poverty standard (Bramley, 1990). The residual income measurement is closely related to the concept of poverty, as assessment of affordability requires comparing the residual income against poverty line. The most common way to set the poverty line is appealing to ‘income support’ level or the social security level (Lau, 2001; p.1).

Hancock (1993) extends the Residual income measurement to include any indication of housing quality. It considers households with affordability problem to the extent that consumption of housing and non-housing goods are both below the socially defined minimum level. However, further information is required to indicate the preference and constraint of the household in order to determine the affordability position of the household.

As it is difficult to distinguish preference from constraint, an extended definition of residual income approach is coined to revise the residual income approach. It defines household with either housing or non-housing consumption under the socially accepted minimum as experiencing unaffordable housing (Yip, 1995; p.62).

In short, Thalmann (2003) gave a clear distinction between ratio measurement and residual measurement of affordability. For ratio measurement, housing is affordable if housing expenditure does not exceed a given share of income; while for residual income measurement, housing is affordable if income minuses housing expenditure is no less than standard non-housing expenditure.

### 3.2.6 Behavioural approach

It is believed that people’s housing consumption behaviour can also be used to assess housing affordability. In order to assess housing affordability, Bramley states that to ‘focus on normal housing decision, looking at what households with given incomes and characteristics, facing given prices, choose to spend’ (Bramley, 1994; p.105). Another behavioural approach is to look at the problem of mortgage arrears and repossessions, so that to investigate the household’s affordability based on their decision. Although different efforts have been found, the previous researches and studies gave only inconclusive result to the understanding of affordability. While some scholars still believe that this approach, theoretically, is more accurate in demonstrating the expenditure pattern of household to the extent that the affordability, addressed as a specific issue and empirical data, is rich enough to allow a thorough investigation (Yip, 1995).

### 3.2.7 Subjective approach

If both normative approach and behavioural approach are regarded as an objective measurement by scientific research and objective data collection, Kearns and Colleagues (1993) offered a completely
different approach, i.e. subjective approach. Kearns and Colleagues adopted subjective approach to study the housing in Scotland. The study simply required the respondent to answer the question about affordability in subjective evaluation of their own situation. The respondent was requested to answer the question in a Likert scale from ‘very difficult to afford’ to ‘very easy to afford’. The qualitative and subjective measurement is checked against their financial position and other quantitative factors. The data collected are used to determine the threshold level of their housing affordability with the belief that the individual is the best judge of their own situation (Yip, 1995; p. 68).

### 3.3 Factors affecting affordability

Under different measurement approaches, some factors affected affordability could be identified. The most obvious one is rent and income. All different approaches largely emphasize on these two factors. Rent is important in affecting affordability, as it determines how much is required to pay for housing. Income is also playing a fundamental role to affect affordability. It determines a household’s ability to pay for housing. Few would doubt these two factors are strongly affecting one’s affordability, but the discussion should not be stopped here. There are other factors affecting one’s affordability in addition to income and rent.

In addition to rent and income, housing expenditure also will affect the level of affordability to pay for housing. No one could avoid housing expenditure if he or she consumes a unit. Housing expenditure refers to those expenses on housing, for instance, tax, rate, maintenance fee, management fee (Mostafa, 2008; p. 89). It is because the amount spent on housing expenditure would at the same time reduce one’s income available for paying housing rent. Higher housing expenditure would reduce one’s household affordability. While on the other hand, the ‘maintenance fee’ and ‘management fee’ items are two technical but complicated areas in terms of ‘housing affordability’ which should be further investigated in other research studies.

Apart from housing expenditure, residual income measurement puts a lots concern on non housing expenditure. Non housing expenditure can be operationalized into money spent on basic living, such as food, education, healthcare, childcare (Mostafa, 2008; p. 89). They are vital for household to maintain a basic living. The supporter of residual income measurement argues that housing is unaffordable if the household is unable to maintain their basic living after paying certain amount for housing rent. Thus, in this point of view, the non housing expenditure would also strongly determine the household’s affordability, especially when it comes to apply on the elderly group.

Quality Based Measurement also emphasizes on the importance of housing quality. It argues that a household is unaffordable to housing if it consumes a housing unit which is below the socially acceptable standard, regardless to the rent paid is below certain ratio. Housing quality can be operationalized into different indicators, such as housing size and household size.
Table 1: Factors affecting affordability (Mostafa, 2008)

<table>
<thead>
<tr>
<th>Different Affordability Measurement</th>
<th>Factors affecting affordability</th>
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<tr>
<td>Traditional Ratio Measurement</td>
<td>Rent</td>
</tr>
<tr>
<td></td>
<td>Income</td>
</tr>
<tr>
<td></td>
<td>Housing expenditure</td>
</tr>
<tr>
<td>Quality Based Measurement and Core Need Measurement</td>
<td>Rent</td>
</tr>
<tr>
<td></td>
<td>Income</td>
</tr>
<tr>
<td></td>
<td>Housing expenditure</td>
</tr>
<tr>
<td></td>
<td>Minimum socially accepted standard housing unit</td>
</tr>
<tr>
<td>Residual Income Measurement</td>
<td>Income</td>
</tr>
<tr>
<td></td>
<td>Housing expenditure</td>
</tr>
<tr>
<td></td>
<td>Minimum socially accepted non housing expenditure</td>
</tr>
</tbody>
</table>

4. The practice in Hong Kong

In Hong Kong, normative approach is commonly adopted to investigate the affordability of the household. The most commonly used indicators are rent-to-income ratio and mortgage-to-income ratio. Rent-to-income ratio (RIR) is the expression of rent as a percentage of income; while mortgage-to-income (MIR) is the expression of mortgage payment as a percentage of income. In spite of rent-income-ratio and mortgage-income-ratio, house price-to-income ratio (HIR) is also another measurement, which is adopted recently. For a single housing unit, it calculates the ratio of current market value of the unit to the total annual income of the family that occupies it; for a market, house price-to-income ratio is the ratio of the median value of all recent housing sales during a given period to the median annual household income in the market under study (Lau, 2001; p. 3).

4.1 Current housing situation of elderly in Hong Kong

According to the Census and Statistics Department in 2006, the top three housing situations of elderly are recorded as ‘Living with children’ (53.5%); ‘Living with spouse only’ (21.2%) and ‘Living alone’ (11.6%) respectively. This result implies that most of the elderly in Hong Kong, in fact, are rely on either their family members or otherwise nobody for any health care or daily lives’ purposes. On the other hand, it is seen that there are a high demand on providing elderly care services too. While the top three types of housing occupied by the elderly in Hong Kong are: ‘Private permanent housing’ (41.3%); ‘Public rental housing’ (41.1%) and ‘Subsidized sale flat’ (16.6%).
4.2 Housing policy for elderly in Hong Kong

After the handover of Hong Kong in 1997, an Elderly Commission was established and mainly responsible for the overall elderly policy. So far, ‘Single Elderly Persons Priority Scheme’ and ‘Elderly Persons Priority Scheme’ are two major programs for the elderly housing (see Table 2 for details). As we can see, the efficiency of both programs should be enhanced since the supplied seats can no longer afford the growing trend of aging population in Hong Kong. Worse still, the shortage of elderly housing causes the longer waiting period of every applicant (the elderly) and finally, deteriorates the quality of daily living as a result.

Table 2: Public housing programs for elderly

<table>
<thead>
<tr>
<th>Hong Kong Housing Authority’s Program</th>
<th>Details</th>
<th>Time required for allocation</th>
<th>Successful cases in 2007/08</th>
<th>Number of cases on waiting list</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Elderly Persons Priority Scheme</td>
<td>Housing for Senior Citizen or One Person Flats are allocated to single elderly applicants</td>
<td>It depends on the availability of public rental houses</td>
<td>1,430</td>
<td>5,410</td>
</tr>
<tr>
<td>Elderly Persons Priority Scheme</td>
<td>For two or more related or unrelated elderly people who are willing to live together in a public rental flat</td>
<td>It depends. The allocation could be done by 2 years if they are willing to live in the New Territories.</td>
<td>630</td>
<td>1,820</td>
</tr>
</tbody>
</table>

Sources: HKHS and HKU 2004, HKHA 2009, & Personal Communication with HKHA

5. Knowledge gap

Previous efforts are found to investigate the factors affecting housing affordability, there are, however, at least two major research gaps which deserve particular attention:

(i) Research on factors affecting affordability are mostly focusing on rent, income and housing related cost (Howenstine, 1983; Maclennan and William 1990; Bramley, 1990; Hancock, 1993). However, other factors are almost being ignored. For example, other non-monetary factors are also playing an important role to determine one’s affordability. Without the critical investigation of these other factors, the complete picture of household affordability cannot be shown and to be further analysed. Worse still, in some cases, merely the half understanding of household affordability would mislead the housing providers and government to formulate inappropriate housing policy and hence hard to provide affordable housing for specific target population. Therefore, a study is necessary to look into the non-monetary factors and investigate the correlation between the non-monetary factors and affordability;
Nowadays many researches on housing affordability could be found and most of them are focusing on general population or some specific group, for instance, poverty group, single parent family, or working population. The in-depth investigation of housing affordability of elderly is relatively limited in academic realm. It is therefore unique if such a research is conducted to investigate the housing affordability of the elderly in Hong Kong.

This research is meaningful as Hong Kong is a minimalist welfare city. It is a place where no universal pension system is provided but its welfare system is highly residualized by only relying on MPF and personal saving as the major financial protection after retirement. Therefore, it is worthy that a research should be conducted to investigate the housing affordability of the elderly so as to enrich the understanding of their situation.

6. Research methodology & details

A structured questionnaire was used in this research to collect data from the better-off elderly in Hong Kong. It is because there were relatively few researches conducted to concern with the affordability of better-off elderly. In general, ‘better-off’ is a relative concept and is only a general term to identify households whose incomes are higher than the so-called Monthly Median Domestic Household Income (MMDHI); while many better-off people are, in fact, ‘just’ affordable to housing or some even to afford housing at the expense of its living quality. Commonly, their relatively high household income makes them to be excluded from government subsidies and protection, for instance, they are ineligible for applying public rental housing under the current housing policy. Thus, it is worth to look into those better-off elderly and to explore the factors affecting their housing affordability.

In present, Hong Kong elderly is defined as who aged 60 or above, this definition is commonly adopted in the academic field. While on the other hand, better-off person usually is defined as a person who is living in a household, which the monthly household income is over the MMDHI of a country or city. Sometimes, other criteria would also be selected to distinguish and identify better-off elderly when there are difficulties to collect precise information on household income such as ignorance or unwilling to reveal of income.

The targeted elderly group are selected from only better-off districts (better-off district means the MMDHI of District is above the MMDHI of Hong Kong), that is over HKD $18,000 (Census and Statistic Department, 2009). In order to find better-off elderly, the scope will be further narrowed down to find better-off Constituency in identified district (better-off Constituency refers to the MMDHI of Constituency is above the MMDHI of Hong Kong). The District Elderly Community Centre in the identified constituency will be invited by the research team to conduct questionnaire interview. The collected questionnaires will be further screened while recipients of Comprehensive Social Security Assistance (CSSA) or tenants of Public Rental House will be excluded from the collected questionnaires due to their unsuitable identity to this targeted population study. Selected elderly interviewees were then
chosen and approached through the centres, which are located in Tsuen Wan, Kowloon City, Shai Tin, Wan Chai, and Sai Kung. A simple random sampling was used to collect information from elderly. The whole questionnaire process is administered completely by the researchers due to the problem of illiteracy.

7. Data description and summary

There were in total 125 elderly answering this questionnaire but the effective questionnaires are only 103. Indeed, 22 out of 133 elderly are either CSSA recipients or tenant of Public Rental Housing who should be excluded from this analysis. Thus, only 103 effective questionnaires could be used for the following analysis as effective data which involved 70 female and 33 male respectively with the average age of 76.1.

7.1 Individual characteristics

All respondents are retired and almost all of them were participated in primary industries or secondary industries, such as Manufacturing, Clothing, and Hawker, before their retirement. 41.7% of the respondents received primary education only; while 35.9% respondents received no education. Concerning the marital status, 91% of respondents are married, but 45% of them are widow. 4% of respondents are single. On the other hand, the health conditions of elderly are generally good; most of the respondents perceived their health status is ‘better’ (29.1%) or ‘much better’ (23.3%) than the people in the same age group; however, melituria and hypertension were still two common diseases for elderly; some elderly even have serious chronic diseases, such as heart disease, cancer, or parkinson disease. 72.8% and 78.6% of respondents are able to perform all tasks in self-care (e.g. take medicine) and daily activities (e.g. dining) without any assistance. The remaining percentage represents the elderly require assistance to perform at least one task in either self-care or daily activities.

7.2 Household characteristics

There are about 39.8% of respondents are regarded as conventional family or ordinary family (elderly are living with spouse and children). For those from unconventional family or unordinary family, 36.9% respondents claim that they are living alone and 19.4% respondents are living with their spouse only. Yet it is not unexplainable that more small nuclear families are formed to replace traditional families in modern society. Moreover, as the target population in this study is better-off elderly in better-off household, their relatively high economic ability further encourages the children to depart from their parents and to live independently. While 89.3% respondents have already owned their housing unit and the remaining respondents were renting their housing unit instead. According to the subjective approach to measure affordability, the mean score is 3.78, this shows that respondents consider it easy to afford their housing based on their subjective assessment.
7.3 Factors affecting housing affordability

Based on the previous literature reviews, it is noticed that income is the most significant factor to consider one’s affordability on housing. However, apart from that, there are in fact some non-monetary but potential factors that we should pay attention to decide one’s income ability and hence his/her housing affordability. The following emphasizes on the non-monetary factors affecting affordability. Non-monetary factors can be divided into two categories: household factors and individual factors. Some hypotheses were set before the investigation of correlation between the variables and affordability. These are:

1. Fewer the working adult in a household, lower the affordability
2. Higher the age, lower the affordability
3. More the health status deteriorated, lower the affordability
4. Lower the education received, lower the affordability

7.4 Numbers of working adult in household

The study shows that the correlation between working adult in household and affordability is 0.426 which is positively correlated. This implies that the fewer working adult in a household, the lower the affordability (Table 3). However, it is believed that elderly group will suffer from this factor more seriously than other age cohorts, because they are usually unable to generate a high and stable income by themselves in the labour market. Besides, poor physical availability and voluntary retirement also makes elderly depart from the labour force which in turn implies that their major source of income is stopped. It is easy to understand that children tend to get rid of their responsibility to afford the housing cost of their parents as to support their own housing cost and living cost. Thus, elderly living in a household without any working adults are usually suffered from lower in affordability.

<table>
<thead>
<tr>
<th>Affordability level</th>
<th>Distribution of Number of Working Adult in Household of Elderly</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>12.7% 0% 0% 0% 0%</td>
</tr>
<tr>
<td>1 (very difficult to afford)</td>
<td>20.6% 0% 0% 0% 0%</td>
</tr>
<tr>
<td>2 (difficult to afford)</td>
<td>15.9% 9.5% 7.1% 0% 0%</td>
</tr>
<tr>
<td>3 (just affordable)</td>
<td>34.9% 33.3% 42.9% 100% 0%</td>
</tr>
<tr>
<td>4 (easy to afford)</td>
<td>15.9% 57.2% 50% 0% 100%</td>
</tr>
<tr>
<td>5 (very easy to afford)</td>
<td></td>
</tr>
</tbody>
</table>
7.5 Age

The finding below records a negative correlation (-0.49) between age and affordability, which is regarded as a strong negative correlation (Table 4). For age group 60-69, no respondent rated unaffordable to housing, but it comes to more respondents rated ‘difficult to afford’ housing in older age groups. Such reverse correlation between age and affordability can be attributed to the specific context of elderly. It is known that almost all elderly have departed from the labour force due to voluntary retirement or physically incapable; the process of wealth accumulation will be stopped once they retired and the saving will be consumed continuously at the same time. Without means to increase their income and saving, the affordability of elderly is decreasing with higher age and hence, it is expected that elderly with older age do need more subsidies from the Government.

Table 4: Cross tabulation between affordability and age

<table>
<thead>
<tr>
<th>Affordability level</th>
<th>Age Distribution of Elderly (by Age group)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>60-69</td>
</tr>
<tr>
<td>1 (very difficult to afford)</td>
<td>0%</td>
</tr>
<tr>
<td>2 (difficult to afford)</td>
<td>0%</td>
</tr>
<tr>
<td>3 (just affordable)</td>
<td>0%</td>
</tr>
<tr>
<td>4 (easy to afford)</td>
<td>40%</td>
</tr>
<tr>
<td>5 (very easy to afford)</td>
<td>60%</td>
</tr>
</tbody>
</table>

7.6 Deterioration of health condition

The correlation between health status and affordability is negatively correlated (-0.541). That is, the more intense of deterioration of health the elderly faced with, the lower affordability they suffered. As we know, elderly usually have hypertension and melituria; yet these two diseases are, in fact, chronic but not serious in relative to other diseases, like cancer or heart disease. The medicine for these two diseases is under government subsidies and therefore exerts less economic pressure to the elderly. However, it is also common for elderly to have serious diseases such as heart disease, cancer, and parkinson disease; these diseases are far more serious than hypertension and melituria, but better or more effective medicine with less side-effect is excluded from government subsidies. The nature of healthcare is a paradox and the demand for medical treatment is inelastic, which means people usually pay for medical cost in regardless of the cost of treatment and they are willing to pay for it at the expense of other living cost, such as housing cost. Therefore, the cost on medical treatment would correspondently reduce one’s level of housing affordability, especially for the elderly with serious disease.
Table 5: Cross tabulation between affordability and deterioration of health condition

<table>
<thead>
<tr>
<th>Affordability level</th>
<th>Distribution of Health Status of Elderly (1: much better; 5 much worse)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>1 (very difficult to afford)</td>
<td>0%</td>
</tr>
<tr>
<td>2 (difficult to afford)</td>
<td>0%</td>
</tr>
<tr>
<td>3 (just affordable)</td>
<td>8.3%</td>
</tr>
<tr>
<td>4 (easy to afford)</td>
<td>16.7%</td>
</tr>
<tr>
<td>5 (very easy to afford)</td>
<td>75%</td>
</tr>
</tbody>
</table>

7.7 Education level

It is found that the correlation between education and affordability is 0.44, which is a medium and positive correlation (Table 6). It proves that elderly with better education are more likely to be affordable to housing. Higher education also guarantees better affordability. In fact, Hong Kong is a place without comprehensive pension and retirement protection system, people saving for retirement is entirely based on their previous occupation and income earning ability. Hence, it could be concluded that better education enables people to find job with more stable and higher income. In other words, low income implies saving is limited and people are unable to buy investment products like shares or insurance to generate future income. As a consequence, saving sounds too limited to afford housing and therefore, for lower educated elderly, they are less likely to be affordable to housing.

Table 6: Cross tabulation between affordability and education level

<table>
<thead>
<tr>
<th>Affordability level</th>
<th>Distribution of Education Level of Elderly</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No education</td>
</tr>
<tr>
<td>1 (very difficult to afford)</td>
<td>21.6%</td>
</tr>
<tr>
<td>2 (difficult to afford)</td>
<td>13.5%</td>
</tr>
<tr>
<td>3 (just affordable)</td>
<td>18.9%</td>
</tr>
<tr>
<td>4 (easy to afford)</td>
<td>24.3%</td>
</tr>
<tr>
<td>5 (very easy to afford)</td>
<td>21.6%</td>
</tr>
</tbody>
</table>

8. Policy Implication & recommendations

To conclude that elderly group is most likely affected by the above individual factors (age, education level and health status) and household factors (number of working adult in household). Say, unconventional family such as singleton elderly or elderly living with spouse only will be affected adversely due to no
more financial support and primary care from their children. Also, elderly with poor education level will be adversely affected due to limited earning capacities and so their low level of saving and assets. Furthermore, elderly with poor health status will reduce their economic availability for affording their housing. Furthermore, the older elderly will be lower in their affordability since their life-long saving is almost all they could consume without any compensation.

Subject to the findings, some recommendations are provided for the government to redevelop and improve the current elderly housing policy. The details are as the following:

8.1 Lessening the existing criteria

Affordable housing should be provided for unconventional family by lessening the existing criteria, i.e. mean-test, to ensure that they are able to afford housing with no expense of their basic living. Meanwhile such criteria could also be reviewed regularly from time to time in order to keep pace with the changing family structures in Hong Kong.

8.2 Tax allowance

Higher tax allowance should also be provided to encourage children to live with their parents. So that those parents would less likely suffer from lacking in care services and facing higher daily living cost; or otherwise, who have to live alone with merely low self-care ability instead.

8.3 Comprehensive retirement protection

Investigate a comprehensive retirement protection system to increase housing affordability of the elderly and the soon-to-be old. Moreover, the scheme could maintain people’s quality of living to a certain extend and to prevent from poverty as a result.

8.4 Specific housing subsidy

A specific housing subsidy should be provided for those birth cohorts who received none compulsory education. The subsidy should be mean-tested. The criteria of such test should be reviewed regularly accordingly and it should always depend on the changes of social demography in Hong Kong.

8.5 Elderly subsidy for health care

Extra subsidies should be provided for the elderly who are with serious diseases, for instance, considering their health status when they are applying for public housing or increase more subsidies for better medical treatment. This could help the elderly prevent from over-worrying about their expenses on medical/health care, so that they would have more (economical) alternatives or become more affordable to the housing
cost or expenditure.

8.6 Investigation on housing preferences of the elderly

Affordable housing subject to the preference of elderly should also be regarded as an important section within the elderly housing policy in order to satisfy not only their physical or material needs, but also their psychological needs and living with dignity too. Therefore, further investigation on preference is absolutely necessary.

9. Conclusion

Previous efforts on factors affecting affordability are simply focusing on economic factors, while other factors, such as housing and non-housing expenditure, personal and social factors are not well covered. It deserves more attention and effort to investigate the factors affecting both affordability and even preference so as to gain a comprehensive picture of factors affecting elderly on housing affordability.

The critical review of the literature contributes to the basic understanding of the concept of housing affordability. The review also provides the framework for factors affecting affordability. It should be addressed that the literature review and the research is not intended to construct an alternative approach to measure affordability. Instead, it aims to identify the factors affecting affordability through the given definition and understanding of the concept. As a result, the factors affecting housing affordability, in addition to monetary factors, should also include: i) Number of working adult in a household; ii) Age; iii) Deterioration of health status and; iv) Education level.

From Table 7, which is about a correlation comparison between those factors and one’s affordability to housing, it is concluded that the ‘number of working adult in a household’ and ‘education level’ are positively proportional while the ‘age’ and ‘deterioration of health status’ are negatively proportional to the housing affordability.

Table 7: Summary of correlation between the variables and affordability

<table>
<thead>
<tr>
<th>Non-monetary factors</th>
<th>Correlation Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of working adult in a household</td>
<td>0.426</td>
</tr>
<tr>
<td>Age</td>
<td>-0.49</td>
</tr>
<tr>
<td>Deterioration of health status</td>
<td>-0.541</td>
</tr>
<tr>
<td>Education level</td>
<td>0.44</td>
</tr>
</tbody>
</table>

Indeed, different non-monetary factors presented above show that the housing affordability will be reduced accordingly. These factors are not only confined into better-off elderly but also expected that they
will exert adversely towards those worse-off elderly too. Thus, further study is expected to investigate on how such non-monetary factors affect the affordability or even preferences of worse-off elderly.

Acknowledgement

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The Organization of Space and its Social, Environmental and Informational Specificities

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Abstract

Since the beginning of the 20th Century, Brazilian public policies have not been widely and coherently directed into the housing problematic, specially the ones concerning land access. It has been no other option to the low-income families but to create informal alternatives to access housing. Despite the failure of the State in the historical processes of occupation and in the physic-environmental, socio-cultural, political and economic conformation of the informal settlements, the self-produced territories may significantly be altered if (or when) the regulatory actions of the public power reach them, all derived from the formal city’s criteria and standards. Beyond the evident social and economic damages, such action doesn’t allow the development and application of any innovative physical solution (such as Geo-sustainable platforms) or any architectural approach (such as Open Building), which assumes the organization of the urban space as an answer to local specificities and users needs.

Into the formal housing production, its processes are decided and controlled by few who are exclusively interested in the capital concentration. This paper purports to analyze the dwelling as an environment that carries within itself and conveys a volume of information historically built by collectiveness, including personal experiences and impressions of the individuals. This equally implies acknowledging the individual as the active agent who decides upon and controls the processes of production of his/her dwelling, while further experiencing it as a significant part of his/her life, thus endowing it with signification. Here, the informational practice approach works as an input to discussions on the possibilities of devising production processes capable of mutually engaging users and direct constructors, as well as other agents involved.

Within the horizon of this proposal lies the increment of autonomous production, wherein architects may act as mediators of information which comes from the technical conception of a dwelling, the users’ wishes, demands and circumstances, of whatever nature, and the materialization and production of built spaces. We take a case study in Belo Horizonte, Brazil, to show that the informational practice approach can be a first step to feed a critical attitude in relation to the formal housing production processes.

Keywords: autoproduction, housing, urban geology, informational practice
1. Aglomerado da Serra

Aglomerado da Serra is a center-south favela of Belo Horizonte, Brazil, consisted of six villages with around 50,000 people occupying approximately 14,000 housing units on an area of 1,470,483 m² (Urbel, 2009). The villages are located on a series of steep slopes, which are cut by streams, with high geological risks. The urban and environmental legislation originally characterizes these areas as inadequate for occupation (non aedificandi areas) because of their declivity but also because they are usually in urban residual areas or water sources’ protection slices. Although the legal restrictions exist, they do anything else than giving the informal status to the territory and aggravating the environmental degradation.

The city of Belo Horizonte, with approximately 2,200,000 of population and 335 km², has around 200 favelas, which occupy 5% of the municipal territory. In order to identify the main problems encountered on favelas, Urbel, one of the social housing agencies in Belo Horizonte, created a planning tool named Plano Global Específico (PGE). Since the 1990’s, the PGEs have been used to guide the City Hall’s rehabilitation programs for favelas, including the Vila Viva (Living Village Program), which is financially supported by the municipal and federal government. According to Urbel (2007a), the Vila Viva is an integrated action of urbanization, social development and land regularization of existing settlements, which enables public offices and community to strength and to consolidate a social inclusion policy.

No doubts that not only Urbel’s but mainly the City Hall’s actions have allowed some important achievements for the population in the favelas: collective services, public equipments (health centers, schools, sports arena, parks), headwaters’ protection, workforce training, all set by an important (but not wide) participative process involving citizens and public officials. The whole Vila Viva program in Belo Horizonte, involving around US$ 320 million, intends to benefit 125,000 people, which means 25% of the whole favelas’ population (Urbel, 2007b).

But, mistakenly, an important aspect is absolutely ignored in order to prevail the simply massive quantity of site work (be it housing units, equipments or road systems). It is not understood that the fragile occupied fields will become potentially more fragile since individual and/or collective actions will continuously be taken for the constant operation of urban activities. Such actions, based on the best individual and/or collective judgment, are consisted of the possible and innovative solutions adjusted to the local context and its social, economic and political conditions. Giving technical and bureaucratic solutions to favelas, while unattached to the local context, will not be sufficient to stop any environmental degradation process.

The construction and/or improvement of road systems and of networks of electricity, water supply, sewage, drainage, allied to the removal and resettlement actions, are usually based on conventional techniques and in private interests that historically have orientated the political decisions about the city. Besides, some other characteristics are still mistakenly present in the housing policies promoted by the public power: the precarious conditions of the construction workers on site, the unthinkable use of light construction components, the inexistence of users’ autonomy and of housing design
individualization. Even if there is a participation process, it doesn’t allow people to actually interfere or alter the urban space production processes but only to choose between pre-defined solutions determined by the public power. Not to mention the decision about the destination of the public financial resources.

For Souza Santos and Rodriguez (2002), the radicalization of participative democracy and economic democracy are two sides of the same coin. It means that if any emancipatory process of the excluded social groups is desired, it is essential to extent the field of democracy from politics to economy. The most critical points mentioned in Aglomerado da Serra’s PGE were linked to violence, environmental degradation, urban services inadequacies, substandard housing, lack of adequate health care and education equipments and difficulty of access to property.

Initially, the road system was reformed, giving access for garbage trucks, buses and ambulances, designed as they are in the formal city. The sanitation system was deployed with interceptors, which were connected to the sewage services of the communities. After that, the water supply was adjusted, allowing the full attendance of the residents. The rainwater drainage system was implemented and the recovery of vegetation on the banks of the existing streams was provided. Through the reallocation of about 3,200 families, who were living in the risky areas or along the streams, representing about 24% of the residents of the Aglomerado da Serra, new houses were built nearby the area. The buildings are usually set on artificial plateaus (the steep topography and geography of each plot are underestimated) and are built with structural concrete block walls, 3 x 4 m prefabricated concrete slabs and repetitive components (windows and doors). The buildings are four floors high with 2 or 3 bedrooms with no possibility of previous interference or posterior design changes.

Figure 1: Urbel’s model for social housing in Belo Horizonte (authors)

This paper aims to acknowledge the user as the active agent who should decide upon the production processes of his/her dwelling and its environmental space. To do so, the autoproduction universe versus the public housing policies in Brazil will be presented. Following, the geo-sustainable platforms and the open building movement appear as two possibilities of organization of space. Both approaches bring the informational practice as an input to discussions on the possibilities of devising
production processes capable of mutually engaging users and direct constructors, as well as other agents involved.

2. Autoproduction and public housing

It is common to find in the Brazilian literature that the housing production is divided into two sectors: the formal, resulted from the legislation, and the informal, produced outside the legal parameters, usually related to precarious and unhealthy conditions. Such a view is seen, for example, in the guidelines of the current public housing policies of the *Ministério das Cidades* (2007), the federal government party responsible for housing provision in Brazil.

![Aglomerado da Serra location in Belo Horizonte (authors)](image)

Figure 2: Aglomerado da Serra location in Belo Horizonte (authors)

A first adjustment is necessary. Most of the formal production is exclusively conceived by a small group of people – architects as well as technicians, designers, developers or construction entrepreneurs – the massive production. Within such logic, the design and the building processes are decided and controlled by a privileged few, while excluding the possibility of alternative modes of production whereby information and knowledge deriving from the immediate empirical experience of users and/or direct constructors and from their social practices could be acknowledged and taken into account – the informal production.

The fact is when the housing discussion remains centred on the settlement’s legality or not, provided by public or private investments, some other issues escape from the debate: (a) the exclusion of users in the decision-making processes of housing, (b) the commodification of housing, (c) the expansion control of the city, (d) the rationalization of the minimum house for workers, (f) the prescriptive productivity of the building industry, and (g) the denial of low-income workers to access land, urban services and credit. Needless to emphasize, they are all essentially linked to the expediency of the reproduction of labour force.

Another point of view is to categorize the Brazilian housing production as follows: the mass production, which is connected to the private investors, real estate market, housing authorities and architects; the autoproduction, which is derived from the direct action of the user. Mass production means to conceive (design and build) houses with few or any participation of people who occupy
them. On the contrary, autoproduction arises when dwellers decide where, when and how to build their own houses (the design process may not even exist).

Despite autoproduction is eventually characterized by low building efficiency or misapplication of materials, it is a legitimate way out especially for poor families. Nevertheless autoproduction also indicates that there is undeniably clear thinking and criticism by the self-producers in the selection and evaluation of options towards their individual needs and aspirations due to the construction, financing, ownership or management.

In this sense, it is assumed here the John Habraken’s view (1970) about dwelling as a result of a housing process - an act of living. If housing is a social process it has to do primarily with ordinary people taking decisions about their homes. This means that if housing process is understood as a continuous human actions upon the built environment (an not as a real state market’s product to be consumed or a dwellers’ subsistence item; in other words, not as a thing) the discussion can be directed to the organization of space and its physical, environmental, socio-cultural, political and economic specificities, beyond the regulatory procedures attendance or not. After all, who benefit from these procedures?

The figures for autoproduction in Brazil confirm that legality is not the important differentiating aspect of housing production. A study by Booz Allen Hamilton, at the request of the Associação Nacional dos Comerciantes de Material de Construção in 2003 (Ministério das Cidades, 2007) states that of the total housing units produced, expanded or renovated in Brazil, both formal and informal, on average 77% are in system of self-management. Around 84% of the whole amount of building materials for housing sold in the country is designated to the autoproduction process.

Several obstacles are identified by the Ministério das Cidades (2007) for not consolidating the private formal production in Brazil, including the lack of supplies, shortage of labour, taxation, the availability of credit, technological delay of the building industry and bureaucratic procedures for approval and licensing. However, the reasons why the Brazilian families opt to autoproduce their dwelling, meaning a path to conquer house, are not fully explained by the housing agencies.

One major issue concerns the fact that social housing policies, especially during the 1970’s and 1980’s, have been historically defined to increase the attractiveness of capital (through the generation of jobs and the expansion of the building industry) rather than to empower the poor families to access urban land or housing in the formal market. Bonduki points out (2008, pp74) that, during such decades, most of the public investments were direct to produce poor people’s own homes; but they were always built by the formal entrepreneurs and structured without any meaningful action to support, in terms of technical, financial, urban and administrative aspect, the production of housing and urban services through alternative means, which incorporated the individual effort and organizational capacity of communities.

The Brazilian building entrepreneurs understand the autoproduction process as a direct threat to the privileged social and physical structures of the formal city rather than a lesson to be learnt. From the State’s point of view, it prevails the idea that once the mentioned obstacles are overcome the supply
of social housing shall be ensured. Nonetheless, the government takes the premise that efficiency is in the same side of the private companies instead of acting to strength the public administration (Arantes, Fix, 2009). The real state market, fuelled by public investment and supported by false justifications of urban growth, directs their actions on what interests it. This means that the poor families will be continuously driven to precarious urban settlements, which are geographically, physically, socially and spatially segregated.

3. Interaction equations

The geologist Carvalho (2000) consider that the urban planners conceive city as a two-layer set of interdependent elements: superstructure (residential, industrial, commercial and institutional buildings) and infrastructure (water supply and sewage, circulation, streets, access, electric and drainage systems). However, the author proposes that infrastructure, which provides the operating conditions of the urban superstructure, should be nominated mesostructure. In the Carvalho’s proposal, the term infrastructure is reserved to the geological system (geological platform). Its primary function is to supply the factors of sustainability to human activities, which will determine the conditions to support the mesostructure and the superstructure and to absorb and mitigate the environmental impacts in the urban environment.

Carvalho (2000) assumes the following factors of sustainability: internal geodynamics, atmosphere, mineral and water resources, biosphere, physical support of human settlements, environmental impacts absorption and special landscape support. In order to perform its functions, the mesostructure must adapt itself to the needs and to the dimension of the superstructure and also to the support conditions determined by the infrastructure. The result of this interaction - harmonious or not - will guide the performance of human settlements. Concerning the interaction between the geological system and the human action, Carvalho (1999) proposes the following equations:

<table>
<thead>
<tr>
<th></th>
<th>natural environment</th>
<th>+</th>
<th>human action</th>
<th>=</th>
<th>technogenic environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>technogenic environment I</td>
<td>+</td>
<td>human action</td>
<td>=</td>
<td>technogenic environment II</td>
</tr>
</tbody>
</table>

Equation I represent the set of changes to the configuration of the geological and natural environment enabled by human action on earth; equation II refers to interactions in the urban environment (not natural anymore) since other human actions already undertaken on site are deliberated. In the resulted technogenic environment, the urban occupation process is a result of decisions taken to have a visible product – the superstructure – rather than a balance between the positive and negative effects in all its dimensions: physical, environmental, socio-cultural and political-economic.
Table 2: Interaction equations: conditions of knowledge about the characteristics of the technogenic environment (constitutive and behavioural aspects) and about the anthropic interaction on the environment.

<table>
<thead>
<tr>
<th>Equation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>III</td>
<td>known environment + known human action = known tech. environment</td>
</tr>
<tr>
<td>IV</td>
<td>known environment + unknown human action = unknown tech. environment</td>
</tr>
<tr>
<td>V</td>
<td>unknown environment + known human action = unknown tech. environment</td>
</tr>
<tr>
<td>VI</td>
<td>unknown environment + unknown human action = unknown tech. environment</td>
</tr>
</tbody>
</table>

The equation III describes the conditions of an ideal city. On the contrary, the equation IV describes a paradoxical situation: having knowledge about the environment but not using it in the name of, for example, the real estate or the conventional (generally expensive) solutions given by dominant groups. The equation V reveals the usual condition of the production of space: the negative response to the mesostructure system. The equation VI is typical of favelas and informal settlements where generally the superstructure anticipate the mesostructure; thus, the user needs are addressed through improvisations such as electricity and water illegal connections, inappropriate waste and sewage disposal in water sources, precarious access, etc.

The last scenario represents the major obstacle to the exercise of the user’s autonomy and also where someone (be it a professional be it a public agent) can glimpse the best possible contribution to the strengthening of the autonomous production.

4. Open building

The Open Building movement is internationally known for the organization of the decision-making processes in the design and the production of the built space through balanced interventions of their stakeholders, with regard to the urban tissue, to the mesostructure and superstructure (following Carvalho’s proposal), to the components that make the space habitable (infill and furniture). The settings of these inter-relations are proposed by physical elements and hierarchical decision clusters. In this sense, the concept of Open Building cover the following premises: (1) the processes of design and construction of space should be decided by its users and the various professionals and participants involved, (2) the technical solutions should allow the systems replacement, while preserving the functions of the whole, and (3) the built environment should be understood as a product in development always subject to change.

The Open Building movement intends to show that the built environment is not composed of static artifacts, but rather the buildings need to be adjusted according to changes or demands, whether social or technical. It also recognizes that the design and production of space involve a number of different participants equally with different and complex responsibilities. In this sense, Open Building express the effort to reduce excessive dependency among those involved in the production processes, but essentially it takes users as active participants in such processes.
The character of improvisation and changing in the so-called informal production favours the approach of the Open Building movement since the dwellers are familiar with the decision-making process about the space and the construction of their houses. The fact that the celebration of agreements is constant, in a daily basis (the "natural relationship" described by Habraken (1999), raises the possibility of the proper functioning of a proposal along the lines of Open Building.

Paradoxically, the attempt to use an approach that gives the user the ability to decide about or change his/her house has a great resistance from the city named formal. The irregularity or diversity of space, as a consequence of such approach, is incorrectly understood as something chaotic, deliberately associated with violence and trafficking; as if the space ordination implies a condition able to mitigate the severe social problems, which have condemned the Brazilian youth. When the Open Building premises are argued as possibilities to guide a new social housing scheme, the general comment made by some local housing agents or even members of the academic community is: “this may end up like a favela.”

Figure 3: Comparison between Urbel and Open Building’s proposal for social housing in Belo Horizonte (Morado Nascimento, Salomão, 2008)

It seems highly problematic that a whole society does not realize the spatial diversity as a natural consequence of social and environmental diversity. In this sense, the questioning of the Open Building approach touches a much deeper aspect – the spatial and physical standardization versus the spatial and social diversity. A starting point in this debate is the relevance or not of the application of typological patterns for low-income population, such as Urbel has been done. However, the comment “this may end up like a favela” becomes relevant if the disordered occupation means damage to the
mesostructure. In this sense, the needed premise is that any community should have access to information in order to amplify its technical repertory to be used in a specific local context. Such premise mitigates the inadequate reproduction of formal and conventional solutions given by the dominant sectors (building industry and public power) unfortunately easily apprehended by the dwellers. How would be possible to share information in order to increase the technical repertory between the involved agents in the housing production processes?

5. Informational practice and mediation

Individuals socially act upon the environment in order to transform the space or, for example, to build a house (the urban activities). Any social act or social practice proper of everyday life is an informational practice because any relationship between individuals presupposes production, transfer and use of information; to that extent, the information links the relationship between objects, contents and persons.

According to Brazilian educator Paulo Freire (1977), actions capable of transforming everyday life reality can be taken because the individual, faced with his/her presence in – and curiosity towards – the world, invents and reinvents her/him. Thus, as a function of the man/world (transforming) relations established by him/her, their systems of knowledge are constituted and may be improved by means of a critical problematization of said relations (Freire, 1977). In this sense, knowledge cannot come from a process in which someone passively receives information from someone else.

When individuals act, a volume of information – technical, juridical, social, environmental, historical, political, economic and cultural – may be produced, transferred and used between social groups. Such information may generate knowledge, in case it makes sense to the individual. That’s how the autoproduction works – the informational practice between the self-producers generates knowledge about the housing production processes – stages, materials, components, systems, tools and equipments (even if sometimes they represent the dominant sector’s repertory). A relevant task that is concerned with the informational practice is: how the architect and the other agents involved in the housing production processes could work in the service of people’s autonomy? Other important questions are how could the public housing agents be involved in the autoproduction process and how could they learn something from it?

Both the geo-sustainable platforms and the open building movement appear as two possibilities of having housing agents with an innovative posture towards the organization of the space. But mainly they presuppose the informational practice, essentially through mediation.

Usually, the term mediation is linked to the idea of intermediating: it can be a point, stage or person whose action between other point, stage or person is possible. Such inference, fairly wide, brings the concept of mediation as an intersection, negotiation or interpretation between people, often opponents or strangers. This can be clearly understood by Law, regarding the resolution of conflicts and the argument for a peaceful settlement. However, this concept of mediation above is rejected, if aligned with the informational practice, since it could raise the possibility of control or filter. The argument
here is in favour of mediation as a place where social practice occurs. This means that in such a place, architects or any other housing agent involved should, when requested, to interact with residents in order to socially promote the production, transfer and use of information (the exchange of ideas or access to technical repertory). In this sense, mediation means to preserve the trial, opinion and experience of residents and to ensure the prevalence of their own decisions and the celebration of agreements.

Architects, but naturally all the others involved in the housing processes, may become mediators of information if they act in the social process of desired and reciprocal dialogue. In the case of Urbel, as the formal interventions conducted by the public power are currently derived from PGE, the agents answer to the urban-environmental and socio-economic diagnostics. The PGE’s methodology reflects the assumption that the well-being of dwellers can be provided through determined housing typologies, conventional technologies and management procedures (the flats’ schemes, the wide avenues, the reinforced concrete containments and the removal and resettlement of inadequate housing).

6. Final issues

The Centro de Mídia Independente (Independent Media Center) published (Movimentos Populares, 2008) a manifesto signed by many organizations and popular movements in the repudiation of the Vila Viva Program, which they called, forced removal program – a perverse policy for the workers who live in the affected areas. Between the various reasons given by them for such rejection, they are briefly analysed here:

a) the choice of the villages to be attended by the program is orientated by the interests of the real estate capital, since only the most valued ones, well located in the city, are benefited;

b) the intervention in Aglomerado da Serra includes the construction of a large avenue that splits the villages in half – Avenida do Cardoso. The whole village is direct or indirectly affected not only by the new road system but also by its consequent social dynamic’s rupture. The neighbourhood relations (the Habraken’s natural relationship) are disrespected;

c) the built stairs, as part of the access system which cut the slopes, work as delimitation for the protected areas (the parks and the headwaters of streams) but they actually isolate them. The parks themselves turn into territories’ limits. Other possibility could be the dwellers work as an environmental guardian; in this sense, the village should decide for an access’ typology adequate enough to allow the public use and the space appropriation (without damages to the infrastructure). Doing so, the territories can devise the economic value, which they already have.

d) the design patterns of the buildings answer the familiar logic of the formal city. On the contrary, the space should allow the changes promoted by the families reconfiguration along time. Furthermore, the flats and the urban space maintenance can be effective only if the
existent social relations in the existent housing schemes are preserved. Generally, people are transferred from their houses to the flats with no consideration to the existent social networks.

e) the removal compensation is calculated without considering the value of land, but only the housing improvements: “Morro das Pedras, for example, has been paid a compensation equivalent to R$107.00/m2 built while the estimated price per square meter nearby is at least R$2,000.00/m2”;

f) the increase in the monthly expenses brought by the new standard housing – water and electricity, results in social conflicts: usually because of the condominium payment delay but also because of the inevitable transfer of the family to another periphery: “the old and invaluable shed was replaced by a flat that is about to enter into the housing market to achieve its value-for-trade”.

Figure 4: Road system and buildings from Urbel splitting the existing social dynamic in the villages (authors)

Brazilian housing agents may design and produce social housing according to the premises of the Geo-sustainable platforms and the Open Building movement since they are extremely consistent with the autoproduction practiced by dwellers as well as they are a valid alternative to the mass produced schemes of the housing authority. However, we also must highlight that much work must still be done with respect to the attitudes and practices of architects, local authorities and the building industry (the informational practice).

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References


Comprehensive Kampung Improvement Programme to Support Better Settlement and Poverty Reduction

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Abstract

The rapid rate of urbanization in the cities presents massive problems to the big cities since they attempt to provide decent houses for the people. Surabaya, one of the big cities in Indonesia, has to cope with pressure on space and resources as its struggle to provide housing and services for the population. As dictate by the Agenda 21 and the Millennium Development Goals, the population of the countries should have adequate shelter and poverty reduction of 50% by the year 2015 (Habitat Agenda 21, 1996 and Millennium Development Goals, 2015). To overcome the problems of inadequate and poor houses in the cities, the Kampung Improvement Programmes (KIP) were implemented during 1978 to 1998. For poverty reduction, the comprehensive KIP programmes, as improvement of the KIP programmes, have been implemented since 1998. This study was to explore the success and unsuccessful of the C-KIP in Surabaya City, how far were the improvements to create better physical conditions in the kampungs and how far were the poverty reductions can be achieved. The method used was explorative survey in the kampungs which received the C-KIP programmes. The study includes the management of the programmes by the kampung inhabitants, the physical improvement of the kampungs and the poverty reduction in the part of the kampung dwellers. The result of the study showed that the physical conditions of the kampungs were improved and the people income was increased during the execution of the programmes. However, as the programmes ended, some kampung inhabitants could not keep the improvement of their income.

Keywords: Comprehensive Kampung Improvement Programme (C-KIP), poverty reduction, physical improvement
1. Background

Comprehensive Kampung Improvement Programme (C-KIP) has been implemented since 2000 in most kampungs in Indonesian cities. The programme includes housing, infrastructure and economy improvement, in the attempt of poverty reduction (Septanti, 2008). In Surabaya, C-KIP has been implemented in more than 40 kampungs and has greatly benefit the society in many aspects.

How far the C-KIP benefit in housing and infrastructure improvement, and increase the economy of the society needs to be studied. In 8 years of its implementation, C-KIP has not been comprehensively evaluated by comparing the results of the programme in recipient kampung, in physical and social aspects. The research will answer the problem of how much C-KIP benefits kampung society in terms of housing condition and infrastructure improvement. As one of the programs related to poverty reduction, it is also important to study how successful the C-KIP in increasing the economic capability of the kampung community. The third research problem is how do the community participate in the success or failure of the programme.

The research of C-KIP roles in poverty reduction was done in Surabaya because it has considered as one of the most successful applicator of Kampung Improvement Programme (Building and Social Housing Foundation, 1993)

2. Previous research

Several previous studies show some success of the C-KIP. As explained by Das (2007) there are kampungs which worked really well in the implementation of the C-KIP but there is also a less successful implementation. This is mostly because the programme managers at each of the different kampungs. With experienced managers, the C-KIP can proceed smoothly and well.

Research of Septanti (2004) showed that the home improvement programs and infrastructure in the kampung in general can be run according to the target, but in improving the community's economy, its sustainability still remains to be investigated.

The improvement of physical environment, such as basic infrastructure repairs, has gone well and many have enjoyed the results of KIP. The role of community in the KIP program is also big enough so that the program can be well implemented. But KIP program has not yet include activities to improve the community economy. KIP program was started in 1976 (Silas, 1993) and in 1998 with the injection of economic improvement programme, the Comprehensive KIP (C-KIP) was implemented.

Research of Happy Santosa and Purwanita (1999) shows the role of women in a fishing village community in preserving the village and home improvement. Research has shown that women are more involved in home improvement, because most of the time the fishermen are at sea. Supervision of the home improvement then handed over to the wife and artisans. Research of Setiawan (2008) shows that the Peneleh, an old kampung in Surabaya, is in good condition, but needs a better
treatment and in some cases the physical condition should be improved. Faqih (2006) revealed in his dissertation that residents from Madura Island in the kampung in North Surabaya, can be integrated with local communities, while in daily life still preserving the culture and social life of the people of Madura. Kampung residents in downtown Surabaya can earn additional revenue from the shopping centres and hotels, and can stay in the kampung which is strategically located close to their workplaces (Setijanti, 2006). Research collaboration between Silas and Septanti (2000) with the University of Newcastle Upon Tyne showed that the kampung communities can supplement their income by household businesses (home-based enterprises) and are quite successful in supporting the sustainability of the family life.

In general, the research that has been carried out by the members of the research team that has been mentioned above are done by means of explorative surveys to elaborate the reality happening on the research area.

3. Research method

3.1 Research plan

The research plan is as follows:

1. To investigate how far the benefits of the C-KIP in homes and infrastructure improvements in the kampung, by conducted a survey to ten locations that had undertaken the C-KIP, the relevant governmental institutions with the program and to the consultants implementing the program.

2. To investigate in what extent the C-KIP has been successful in improving the economy of the kampung inhabitants, by conducting a survey of the research area such as those in number 1 above to make observations and interviews to the people who receive the program.

3. To investigate the participation of kampung communities in the implementation of the C-KIP, by conducted a survey to the kampung chief in the location of research and the governing body that has established by the programs in the kampung.

This research is exploratory research, where data collection and survey at the site were intended to explore the unknown condition in the research area. The components studied in the research in order to answer the research questions are:

a. Physical condition of homes and infrastructure in the kampung before and after the C-KIP programme to examine how much improvement has been achieved.

b. Interview residents who receive the program, to get an explanation of the benefits of home improvement and kampung basic infrastructure.

c. Interview families who received initial funding to improve the family economy, to get an explanation of the improvement of family income.
d. Interview C-KIP programme managers of the kampungs, to find out the effectiveness of the funds lent to the public, to find answers to any activities that have been conducted in supporting the program.

e. Interview the kampung elder who served in the C-KIP implementation to see how far the role of kampung’s head in the implementation of the program.

### 3.2 Research instrument

Survey of houses and infrastructure improvements carried out by viewing and recording conditions to compare kampung condition before and after implementation of the program. Recording and drawings were made during the field survey. Interviews were also conducted to determine public opinion about the benefits of physical repair homes and infrastructure, based on a structural questionnaire. A survey on economy improvements was carried out by interviewing people who received grants to improve their efforts in increasing the family income. A structured questionnaire was used in this process. Instruments used in surveys to determine the role of kampung communities in the implementation of the C-KIP are interviews with community, the C-KIP managers and kampung elders of the location surveyed.

Selected sample of the kampung in the research are five success kampungs and five less successful kampungs in their implementation of C-KIP. This was aimed to compare between the two conditions to found answers about the causes of the success and failure of the program.

Evaluation related to home and infrastructure improvement based on the minimum standards for habitable housing and infrastructure standards for the settlement. Evaluation of the success of programs related to poverty reduction is done by comparing incomes before and after implementation of the program, and the evaluation of increased revenues based on minimum standards of income for low economic groups. In the analysis of community participation, measures of success are determined of how many people involved, activity of C-KIP management agencies and sustainability of the community role/ involvement.

### 4. Implementation of Comprehensive KIP

As mentioned before, research was done in ten locations in Surabaya. The area was distributed in North (Pegirikan, Gading), South (Banyu Urip, Kupang Krajan, Jambangan), West (Tandes Lor, Tandes Kidul) and East (Kenjeran, Sukolilo, Keputih) of Surabaya. The program consist of three main programmes: home improvement, basic infrastructure improvement, and economy improvement. Other factors that relate to the success of the program are community participation.

#### 4.1 Home and infrastructure improvement

Home improvement program was done by renovating some parts of houses (eg. 41 houses in Pagesangan), renovation of the bathroom and toilets (eg. in Gading and Kupang Krajan), and connection to clean water for household (such as in Kampung Sukolilo) to improve the quality of life.
Basic infrastructure improvement was done in many ways, such as: improvement of the access road and bridges, pavement of the road, improvement of sewerage system, provision of trash can, fence for public parks, repainting of the schools, public toilets, and planting productive trees and bushes (fruits and herbs).

Table 1: A summary of the home and infrastructure improvement of C-KIP (Survey, October 2009)

<table>
<thead>
<tr>
<th>Sub District</th>
<th>Implemented Programs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banyu Urip</td>
<td>improvement of the access road and bridges, instalment of street lighting, improvement of sewerage system, provision of trash can, fence for public parks, repainting of the schools, public toilets, and planting productive trees and bushes (fruits and herbs).</td>
</tr>
<tr>
<td>Kupang Krajan</td>
<td>improvement of the access road, improvement of sewerage system, and planting productive trees and bushes (fruits and herbs).</td>
</tr>
<tr>
<td>Pegirikan</td>
<td>improvement of sewerage system, pavement of the road, provision of trash bin and cart, and planting productive trees and bushes (fruits and herbs).</td>
</tr>
<tr>
<td>Gading</td>
<td>improvement of the access road, improvement of sewerage system, and planting productive trees and bushes (fruits and herbs).</td>
</tr>
<tr>
<td>Pagesangan</td>
<td>improvement of the access road, improvement of sewerage system, provision of trash bin and cart, public toilets and planting productive trees and bushes (fruits and herbs).</td>
</tr>
<tr>
<td>Tandes Lor</td>
<td>improvement of the access road, fence for public parks.</td>
</tr>
<tr>
<td>Tandes Kidul</td>
<td>improvement of the access road, improvement of sewerage system, provision of trash bin and cart, and planting productive trees and bushes (fruits and herbs).</td>
</tr>
<tr>
<td>Kenjeran</td>
<td>improvement of the access road, improvement of sewerage system, provision of trash bin and cart, and built river embankment along the fishermen settlement.</td>
</tr>
<tr>
<td>Sukolilo</td>
<td>improvement of the access road and bridges, improvement of sewerage system, pavement of the road, provision of trash bin and cart, public toilets and planting productive trees and bushes (fruits and herbs).</td>
</tr>
<tr>
<td>Keputih</td>
<td>improvement of the access road, improvement of sewerage system, and garbage/waste treatment</td>
</tr>
</tbody>
</table>

4.2 Economy improvement

Economy improvement was done through the lending of money for small and medium scaled bussiness with revolving fund. The community must first formed groups consisting of 5 to 10 members (KSW-Kelompok Swadaya Warga; Self-help Community group), in order to be able to get the loan from the Cooperative. Other programs done in order to increase the capacity of the family are through short courses or training. By increasing the skills, it is hoped that family can earn more money.
Loans of capital were available to KSWs in all of the research location, while the training was not implemented, because the community felt the impact of training program is more likely long term, while most of the community prefer short term impact.

Table 2: Numbers of the initial society group (KSW) receiving the loan
(Final Report, C-KIP 2003)

<table>
<thead>
<tr>
<th>Sub District</th>
<th>Number of KSW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banyu Urip</td>
<td>25</td>
</tr>
<tr>
<td>Kupang Krajan</td>
<td>60</td>
</tr>
<tr>
<td>Pegirikan</td>
<td>11</td>
</tr>
<tr>
<td>Gading</td>
<td>14</td>
</tr>
<tr>
<td>Pagesangan</td>
<td>45</td>
</tr>
<tr>
<td>Tandes Lor</td>
<td>11</td>
</tr>
<tr>
<td>Tandes Kidul</td>
<td>15</td>
</tr>
<tr>
<td>Kenjeran</td>
<td>4</td>
</tr>
<tr>
<td>Sukolilo</td>
<td>12</td>
</tr>
<tr>
<td>Keputih</td>
<td>14</td>
</tr>
</tbody>
</table>

4.3 Role of community (community participation)

Society is a much needed resources in the implementation of any programs in kampung improvement in order to reduce poverty. It can determine the success or failure of the program. The role of community in the implementation of C-KIP can be described as follows:

1. Group of community representatives who oversee the implementation of development activities in the kampung. Consists of the chairmen RW (Rukun Warga – Community Board) and RT(Rukun Tetangga – Neighbourhood Board) if needed.

2. RW chairmen are then chose a proper and appropriate people to manage and implement kampung development and incorporated in the "kampung development agency"

3. Task groups and task forces formed to perform certain tasks, related to social aspects, economic, and cultural environment. This group is ad-hoc, as needed, and disbanded after the task is complete (Community Assistance Team - Department of Architecture ITS, 2002)

Every kampung that received the C-KIP has established Yayasan Kampung (Kampung Foundation) and Koperasi Serba Usaha (Diversified Business Cooperative) such as described in table 3. C-KIP based on Tribina Principles (three-aspects) including human, environmental and business, targeted to the low-income communities. Community participation achieved through the established institutions of society, namely:
So the success of C-KIP in kampung improvement relies heavily on the work of the kampung community itself and the established institutional effectiveness. The success of C-KIP can be measured by the success criteria as follows:

1. Community Self Mapping (CSM)
   - Have manual and understand the implementation
   - CSM are implemented, there are results and the implementation effort
   - Residents can take advantage of the CSM
   - There is a desire to develop the CSM

2. Community Institution
   - Residents understand the importance and wanted community institutions as Yayasan Kampung (YK)
   - Community institution established and perform its function
   - Citizens are able to make decisions about problems in the neighbourhood
   - Residents resources increased
   - Established citizens action group

3. Revolving – Growth System
4. Community Group Business
- Formed and more diverse group of business people
- Ability to develop business outside the kampung
- There are many varieties of new businesses
- Established expertise in business skill
- There is a network of community groups of business

5. Increased Quality of Life
- Better physical condition
- Presents a sense of security - comfortable
- More conducive working conditions
- Equality rights - the opportunity to work
- Opportunities and the ability to work better

(Community Assistance Team ITS Architecture Department, 2002: II.12)

5. Assessment of Comprehensive KIP

5.1 Assessment parameters

Statistical analysis was done through descriptive method - scoring / weighting, intended to assess the results of the proposed questionnaire. Scoring method is used according to the options provided. This assessment is performed on each question that is posed in the questionnaire. Scoring criteria on the assessment variables in the 3 aspects of C-KIP performance includes aspects of infrastructure, economy and community participation. Assessment carried out between range of 1 to 3, adapted to the context of each variable. Here is a rating from 1 to 3; 1 = Weak, 2 = Quite Strong, 3 = Strong

In the aspect of home improvement, the assessment was done by using a range of 1-3. Assessment based on the condition of infrastructure; 1 = Maintained, 2 = Bad, 3 = Poor. Infrastructure is assessed as an improved infrastructure in each kampung who had C-KIP. As for the improved infrastructure, among others; Road, Bridge, Channel Water, Solid Waste (garbage cart repairs, repair bins), street lighting, repair toilet, Reforestation.

For economic assessment at the kampung, three ranges of assessment are; 1=Developed (There are revolving funds, used either locally (residents) as well as from outside), 2 = There and Stay (There, the funds remain undeveloped), 3= Not Evolved (No funds are rolled out).

For the assessment of the role of kampung communities, the assessment carried out on the operationalisation of YK, KSU and KSW. Assessment was also conducted on a range of 3 assessment, namely; 1=Developed (There are activities, and are still operational), 2 = There and Stay
(Legally still exist, but no activities), 3= No Growth (No activities). Developed, if the institutional as well as KSU and KSW still played a role in the sustainability of the program, There and stay, if the institution exists but without activities. And No growth, if there is no institutional home exists and operates.

5.2 Home and infrastructure improvement assessment

From the surveys it was found that most of the basic infrastructure related to roads and bridge are still in good condition (85 % of the access road still in good condition), while the public infrastructure such as public toilets and garbage bin/cart are in bad condition or not maintained properly. The complete result is shown in Figure 1.

![Infrastructure Assessment](image)

Figure 1: Infrastructure Assessment (data analysis, 2009)

5.3 Economy improvement assessment

The assessment of economy improvement was done by looking at the improvement of the business done by the community groups. Business that had developed since the implementation of C-KIP reached 57% (figure 2). 35 % of the business are still there but could not be developed because of many factors, such as the limitation of human resource. Small business developed are among other food sellers, consumer goods stall, handyman workshops, smoked fish stall.

![Business Development Assessment](image)

Figure 2: Business Development Assessment (data analysis, 2009)
5.4 Community participation assessment

For the assessment of the role of kampung communities, the assessment carried out on the operationalisation of YK, KSU and KSW. Since the community was involved in the process of implementation from first stage (forming the institution, making plans of the improvement, etc) until the execution of the programs, then the success or failure of the programs greatly influenced by the community participation itself. In general, the role of kampung Foundation (YK) was usually ends at the same time with the end of the programs (one year). But this condition was not applied to the cooperative, because they still have revolving funds to lend to the community.

Table 4: Activities of Kampung Foundation and Cooperative established in C-KIP (Survey, October 2009)

<table>
<thead>
<tr>
<th>Sub District</th>
<th>Yayasan Kampung (YK)/Kampung Foundation</th>
<th>Koperasi Serba Usaha (KSU) / Diversified Business Cooperative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banyu Urip</td>
<td>There and Stay</td>
<td>No Activity</td>
</tr>
<tr>
<td>Kupang Krajan</td>
<td>There and Stay</td>
<td>Developed</td>
</tr>
<tr>
<td>Pegirikan</td>
<td>There and Stay</td>
<td>There and Stay</td>
</tr>
<tr>
<td>Gading</td>
<td>No Activity</td>
<td>No Activity</td>
</tr>
<tr>
<td>Pagesangan</td>
<td>There and Stay</td>
<td>There and Stay</td>
</tr>
<tr>
<td>Tandes Lor</td>
<td>No Activity</td>
<td>There and Stay</td>
</tr>
<tr>
<td>Tandes Kidul</td>
<td>There and Stay</td>
<td>There and Stay</td>
</tr>
<tr>
<td>Kenjeran</td>
<td>No Activity</td>
<td>No Activity</td>
</tr>
<tr>
<td>Sukolilo</td>
<td>No Activity</td>
<td>No Activity</td>
</tr>
<tr>
<td>Keputih</td>
<td>No Activity</td>
<td>No Activity</td>
</tr>
</tbody>
</table>

Figure 3: Activity of Kampung Foundation (data analysis, 2009)

From the table 4, it can be concluded that most of kampung foundation activities end within one year. This condition would have been avoided if the community had the legal power to manage the kampung foundation for community purposes other than C-KIP. Good coordination between
kampung foundation and other established institution within the kampung also important so that each institution can work properly.

![Activity of Cooperative](image)

Figure 4: Activity of Cooperative (data analysis, 2009)

6. Conclusion

Since 8 years of its implementation (2000-2008), C-KIP has shown some successful efforts in combating poverty. Result of the research shows that in physical aspects, the community benefit Comprehensive KIP through the quality improvement of the environment, housing condition and settlement’s infrastructure, that are still in good condition. In economical aspect, Comprehensive KIP has successfully developed 57% (fifty seven percent) of small and middle scale business or industry managed by the community. Kampung Foundation (YK) and Diversified Business Cooperative (KSU) are highly influenced by the role of community/participation in managing programs and revolving fund, so that the program can be simultaneously applied in the Kampung.

References


Housing Model for Reconstruction Post Mega disaster for Re-establishing Community- Case Study Earthquake and Tsunami in Aceh

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Abstract

In the morning of December 26, 2004, mega earthquake and Tsunami hit North Sumatera and Aceh, and several other areas to as far as the north-eastern coast of Africa. World community was shocked at the magnitude of the disaster that in ten minutes killed to about 300,000 people of various races. The disaster destroyed thousands of homes and structures, on a scale not known by present and the previous generations. Aceh was seriously destroyed, particularly in areas along the western coast. A few months later another strong quake hit Nias killing more people and destroying more homes, buildings, bridges, etc. witnessing the devastation, the world communities reacted promptly and in no time were able to raise a substantial amount of resources both fund and human, that has never been seen before. The community of East Java Province reacted positively with housing technology inputs developed by the Laboratory for Housing and Human Settlements of Institut Teknologi Sepuluh Nopember (ITS) in Surabaya. When visiting the disaster area, even the experienced and seasoned experts have difficulties in deciding how best to resolve the problems effectively and efficiently. The Laboratory based on its vast experience propose and implement house design with kampung technology that were able to erect a timber house of 40 m2 in less than eight hours (the army construction battalion need only four hours) by lay people using simple tools that is available anywhere. The house design can easily be modified to meet the different needs from offices, schools, clinics, etc. Calang, the capital city of Aceh Jaya Regency was flattened but were able to function again in about two months time. No national and international agencies dared to work in Calang as the roads and bridges were missing in many places. This paper explained the effort in re-functioning Calang rapidly and efficiently to enable the local government to work in rebuilding better settlements sooner than anybody’s guess. It was only possible due to the rapid way of house construction, including some that has been modified for offices, schools, clinics, etc.

Keywords: earthquake, tsunami, timber house, Aceh.
1. Setting

Mega catastrophe in Aceh and North Sumatera at the end of December 2004 has destroyed North and West coastal area of Nanggroe Aceh Darussalam (NAD) Province. Natural disaster caused by earthquake with the magnitudes 9 in the Richter’s scale was followed by the biggest tsunami disaster in Indonesia ever recorded.

Until one month after disaster, all aids and relieves effort were concentrated on basic need such as food, clothes, medicine and tents that have only limited lifetime.

![Figure 1. (a) and (b) : Aceh after disaster](image)

2. Exploring situation

The most destroyed area by the mega earthquake and tsunami was Calang (recoqnised as ground zero), the capital town of Aceh Jaya Regency. Only in less than 20 minutes, the town was demolished as no single building was left standing. Calang situated on the western coast of Aceh is a newly built capital town of the Regency. As a port town, Calang was initially developed in a beautiful bay, surrounded by scenery shore, lust tropical forest and attractive mountain as backdrop. After the disaster, only part of the forest remains with scared mountain as a silent witness of the mega calamity.

When the earthquake and tsunami hit in the morning of Boxing Day, the town’s people were active with their Sunday leisure’s was in shock and have almost no time to escape. Therefore more than 75% of inhabitants of Calang were killed. In a short time, Calang became a huge cementery as well as a no town.
3. Idea

Based on solidarity and humanitarian spirit, aid rapidly arrived from around the world to damaged parts of Aceh Province. A great number of aids (and relief personnel), especially food and medicines arrived along with military and medical staff that reached many parts of the disaster area. However, very little came to Calang as it can only be reached from air or landing ships as many bridges as well as the ports were swallowed by the sea.

Members of the Laboratory for Housing and Human Settlements of ITS reacted promptly on the first working day the new-year (2005) to work out the best way to lessen the burden and misery of the victims of the disaster. In line with the main expertise and experience on low cost housing project, members of the Laboratory discussed to find soon the most appropriate ways in relieving the sufferings of the victims, though not directly involve in life saving effort.

Based on conventional wisdom for shelter, the victims should be served with tents for the first 3 months. There after shelter will be needed and become serious if immediate actions were not taken. But no single agency, national nor international was inclined to go to Calang, a place of non-communicable by normal means of transport. This challenge needs to be responded as well.

For this the Laboratory for Housing and Human Settlements of ITS design a non-conventional approach of house construction for disaster with limited local support in any way, and ready sooner than the end of the emergency period. The house (called RIA- stand for Rumah ITS untuk Aceh or House form ITS for Aceh) is the one and only model available at that time.

RIA can be built by anybody with no building skill, simple tools (hammer and saw) and one type of material (timber plank) and corrugated iron sheet for roofing. The foundation consists of footing of soil cement that cured in about 24 hours. Three laypersons can finished the house in eight hours, but army construction battalion members can build the house in only half the time.
4. Concept

Basic principles of RIA:

1. Made from simple material and with simple tools.

2. Easy and quick to be built by anyone, not necessarily skilled carpenters. With three adults the house can be finished in about 8 hours.

3. Easy to be built in any kind of place, not depending on special site situation.

4. Earthquake resistance.

5. Flexible to be modified for function other than house, such as office, market, school, clinics, praying house, etc.

6. Easy to be further developed by the victims for post occupation need.

Figure. 3 : Model of RIA made from cartoon paper

5. Design

According to the Presidential Instruction, minimum standard for disaster mitigation, net house size is 36 m² plus simple toilet and kitchen. RIA easily met these requirements. The design concept of RIA consists of simple material (wood planks) and simple tools (saw, hammer and nails), with high flexibility to meet other functions.
Figure 4: Plan of RIA

Figure 5: Section

Figure 6: Details of Stilt
6. Cost estimate

For each RIA house, the cost will not exceed than 15 million Rupiah (equal to US$ 1500), for material and man power.

Table 1 : Estimation of RIA- Construction Cost (36m2 plus)

<table>
<thead>
<tr>
<th>No</th>
<th>Material</th>
<th>Sum</th>
<th>Unit</th>
<th>Unit Price (Rp)</th>
<th>Amount (Rp)</th>
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</thead>
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<tr>
<td>1</td>
<td>Meranti Timber Plank 2x20x400</td>
<td>291</td>
<td>sheet</td>
<td>33,600</td>
<td>9,777,600</td>
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<tr>
<td>2</td>
<td>Hinge T.10</td>
<td>9</td>
<td>piece</td>
<td>7,500</td>
<td>67,500</td>
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<tr>
<td>3</td>
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<td>sheet</td>
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<td>1,949,400</td>
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<tr>
<td>4</td>
<td>Iron-Zinc Plate</td>
<td>10</td>
<td>m</td>
<td>28,000</td>
<td>280,000</td>
</tr>
<tr>
<td>5</td>
<td>Wood Nail (2” &amp; 3”)</td>
<td>14</td>
<td>kg</td>
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<td>112,000</td>
</tr>
<tr>
<td>6</td>
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<td>24,000</td>
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<tr>
<td>7</td>
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<td>piece</td>
<td>200</td>
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<tr>
<td>8</td>
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<td>bag</td>
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<tr>
<td>9</td>
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</tr>
</tbody>
</table>

**TOTAL** 13,345,400 (US$ 1400)

Because of difference location, the cost estimate must be added by deployment of materials.
7. Organizing the resources

7.1 Preparation for development

1. Coordination
To build a RIA house in an isolated area simple and easy, need no of special requirements. To ensure it’s applicability, PWD of Provincial Government of East Java coordinate the resources including personnel from the Military Construction Battalion, University members, Private Sector, Community Organizations, etc.

![Diagram 1. Scheme of Coordination](image)

2. Participation and Funding
As the spirit of solidarity from East Java community for Aceh, many resources were made available and committed to help people in Aceh. Government of East Java Province is the leading sector that coordinates all the resources. ITS as the planner of RIA and provider of man power for construction (students), work together with the Construction battalion of Brawijaya Army Division assisted by the Navy in mobilization man power and materials from Surabaya to Calang. Public Works Department of East Java province provide moving equipments and operator for land clearing. Some private sector donates materials for construction such as steel bar and nails.
3. Mock-up

![Figure 7 (a), (b), (c), (d): Mock Up of RIA- made in Campus of ITS, Surabaya](image)

4. Training

![Figure 8 (a), (b): Training of Army Personals](image)
Figure 9 (a), (b): Training of ITS Students as humanitarian services members

8. Development

1. Land Preparation

Figure 10 (a), (b): Land Preparation with heavy-duty vehicle
2. Construction

Figure 11: Construction Stages

(a). Setting the foundation

(b). Erection of the main frame

(c). Connecting main frames

(d). Install the wall and window holes

(e). Plastering the floor

(f). Toilet and water tub
3. Results

Construction period started from February to April 2005. During the period, more than 600 houses was built in various function, such as houses, schools, offices, health clinics, mosque, etc.

During the construction period, several strong after quake and typhoon occurred in Calang. RIA house proved that it is in deed earthquake and typhoon resistance, tested by the nature. RIA as pioneering working shelter for disaster victims in Aceh, were used longer than it was planned to at least June 2009, especially for public buildings.

![Figure 12: New Housing and Settlements of RIA in Calang](image1)

![Figure 13: Playgroup School made with modification of RIA module](image2)
Figure 14: Elementary School made by modification of RIA module.

Figure 15 (a), (b): Dept. of Education Office and many others made with modification of RIA module

Figure 16: New Settlement in Calang made with RIA modules.
9. Lessons learned

The two main obstacles faced are:

1. Indonesia does not have regulation to bypass ordinary condition in the terms of disaster mitigation. When mega disaster occurred, normal rules and regulations for building is not applicable for critical condition and is a great constraint to meet the limited speed and mega scale of the work.

2. Organizations and coordination system at government level have no understanding or ideas on the critical needs in disaster mitigation.

Two other critical challenges that were faced:

1. How to ensure that stakeholders in disaster relief effort arrived at solution that is affective for emergency condition and adequate fund is available.

2. The challenge from the beneficiaries’ point of view are how to make sure to the victims serve with RIA houses are much better off compare to when living in tents or barracks that only served the shelter need temporarily compare to RIA for permanent solution if needed.

By the speed of re-functioning of local bureaucracy in a relative short time, enable the good coordination of assistance in such that result can reach the most needed area in an effective and efficient way, delivering quality work that enable in the delivery of living and working condition better that before the disaster. This has been proven by Calang as the only town that managed to reinvent itself in a such a way that better condition has been made possible compared to any city or town in Aceh and Nias as of today.

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Affordable Housing for Widow in Urban Area- Case study: Arba’in House, Bangil, East Java, Indonesia

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Abstract

Low income groups in urban area mostly live in a condition where they do not have proper liveability, with less or even the absence infrastructure, services and facilities. This condition worsens if the people did not have enough resources in improving their life, such as employment, capital, or human resources (family). This group of community include the widow. Housing for all has been an important issue in sustainable development – as stated in Habitat Agenda – especially in developing country like Indonesia. Houses built by the government is still unaffordable for some groups of community such as widow, since they usually lacks the financial and legal resources. Therefore it needed special scheme in assuring the housing delivered to this particular group of community. This paper elaborates the possibility in housing provision for widow by the surrounding community. The method of the study is explorative study in housing occupied by widow, and also comparative study in terms of physical and social condition of the inhabitant between the first and fifth year of occupancy. The result of the study shows that in five years of occupancy, these women can improve their quality of life, with community as enabler. However, access to housing ownership is still not available.

Keywords: affordability, service and infrastructure, widow
1. Introduction

1.1 Bangil, East Java, Indonesia

Bangil is a sub district of East Java Province, about 45 km from the capital city, Surabaya. It is part of Pasuruan Regency. Bangil located in the access route from Surabaya and other city in the eastern part. The area of Bangil land use consists of 7% for agriculture, 43% for housing and settlement, and 50% for roads, public facilities and services. The region like most of the towns and cities have undergone a process where agrarian economy and culture are being replaced by dynamic society with diversified economy based on industrialized production.

The people of Bangil are mostly moslem, the activities is synergized with the values of the religion, Islam. One example is most of the stores are closed on Friday noon due to the Friday pray at the mosque. There are many Islamic boarding schools. The area of Bangil sub district is about 500 sq km. Most of the people work in private sector, especially in agriculture and handicraft (embroidery). Some also work in the pharmaceutical plant and food factory in surrounding area.

1.2 Arba’in house

Rumah Arba’in (Arba’in House), provides temporary housing for widow. The widow came not only from the area of Bangil, but also from other regency within the East Java. The widow and her family were allowed to stay for 5 (five) years and they only have the obligation of paying the electricity and clean water supply’s bill. After 5 years, they were given an evaluation. If the widow has been able to support her family then she must moved out. But if she hasn’t, then she was allowed to stay again until she has a proper job and resources to support her family.

Arba’in House consists of 40 single-detached houses. It was built in two phases, each for 20 houses in 2001 and 2003. The first occupancy was on August 17th, 2001. The construction of the house has met the minimum requirement of healthy house. The land was formal, owned by a wealthy merchant who also fully funded the housing project with the help of his nephew architect. The size of the house is approximately 40 sq m, with average occupancy of 3 people. The housing was equipped with a mushala (small mosque) and a children playground in the middle of the housing block.

Figure 1: Arba’in House, Bangil (Documentation, 2004)
2. Women and housing

2.1 Housing affordability

Affordability of housing deals with many aspects, such as household income, supply and demand of housing, housing cost, and housing policy. Affordability also closely related to culture and social condition of a region. In economic aspect – in US and Canada - , houses are considered affordable if it cost no more than 30-35% for instalments of the household gross income, while in other aspects, easy access to work is considered affordable. Although the term is often applied for housing of those in the lower income ranges of a geographical area, the concept is applicable to both renters and purchasers in all income ranges.

Millions of people in Asian cities are tenants. Rental housing may be only a partial answer to urban housing problems, but it is an important housing option — especially for the urban poor, and particularly in situations where people are not ready or able to buy or build houses of their own. In spite of this, governments in Asia have done little to support the improvement of rental housing which already exists or the expansion of affordable rental housing in new areas (UN HABITAT, 2008). The support of private sectors and community then was important in the improvement of the rental or social housing.

2.2 Housing for women

Women and men have different needs for spaces in their physical surroundings in their everyday life, needs that are interpreted as practical gender needs in human settlements (Grundström, 2005). These special needs will be more important in the case where the woman acts as the head of the family. She will have specific needs in order to support her role as the person who earns money for the family while at the same time caters the family. Housing in this case should be able to protect the family from conditions that threaten life and health, physically and mentally. Important to bear in mind is that according to Moser (Moser 1994) in most low income household in developing countries women have triple role : production (work to earn money), reproduction (cater the family), and community managing work (maintaining and ensuring resources to community).

Poverty in urban area affects population in a different ways. It strongly affects women and children. As a result, they are the most vulnerable groups in the society. To support poor women in urban areas, there is a need for gender-sensitive urban development and housing policy to take into account the facts that; women need independent access to adequate housing, adequate infrastructure for income generating activities, adequate infrastructure for reproductive work, safety and security in private and public space (Becker, 2003).

Poor women often have to earn their income through ‘survival activities’ such as petty trading, prostitution and small-scale agriculture. Women also run micro-enterprises involving market trading, restaurant, bars, shops, bakeries, sewing and mending clothes. In many countries, the informal economy, especially the ‘bottom end’ with lowest returns, is a female economy (Tannerfeldt, 2006).
The potentials owned by women then not fully explored. Many had proven that women can be the agent of change, such as the Grameen Bank Programme in Bangladesh. It proved how much women can accomplish when given a chance – tools, information and a little bit of cash.

Despite the vulnerable condition, women – especially widow- still have to face another obstacle in society, facing the negative stigmata of a woman. They often considered a mistress or a burden to society due to the minimum capacity they had. This will end up in more difficult living condition. These facts strongly prompted a special housing for widow.

3. Housing occupancy

Rumah Arba’in was first occupied in August 17th, 2001. Back then, only 20 houses were built from 40 planned. The next 20 houses were built in 2003. From the 40 houses, only 39 were occupied, because one house (next to the Mushala) is used for children education purpose. There are now 104 occupants, with 45 of them are adults. The study was done in 2004 (first year occupancy) and 2009 (fifth year occupancy).

3.1 First year occupancy

Housing infrastructure and facilities are prepared from the beginning of the development. Clean water was supplied by the city water supply, two houses shares one water pump. Electricity is available. For sanitation, each house has bath, toilet, and laundry facility. House lots are equipped with gutters for the drainage and septic tanks to process wastes from the toilets. Playing Ground and Mushala are located in the centre of the housing site. Household wastes are collected regularly, rubbish bin located at the front of each houses.

Social activities in Arba’ in House include communal praying (every week on Thursday evening) and routine Al Qur’an reading at the Mushala, also monthly gathering called Arisan (where women collect their money as community reserved fund). The arisan was done not only in the housing, but also in the neighbourhood area. These activities are strengthening the social relationship between the dweller and the community.

Most of the dwellers (90 %) work in informal sector. Economic activities of the widow include sewing and tailoring, selling food, and housekeeping. One of the widow earns money by cooking meals for Pondok Pesantren students and employs two of her neighbour widows.

Housing costs include monthly water and electricity payment. The women do not have to pay the rent for the house, but they were required to follow rules to stay in the house (e.g. dwellers must not allow a visit by male guest that is not her muhrim [a blood-related family] inside the house, curfew applied after 10 pm – unless there are special occasion like wedding party or pray gathering. The widows in the house were given a subsidy by the owner of the housing in the form of rice (every month) and little cash (every three months). The government gave support for income generating activities by giving 10 (ten) sets of sewing and embroidery machines. The machines were used to produce Muslim wear and hats by the dweller. Community support was given by donation (money or other goods).
3.2 Fifth year occupancy

Housing infrastructure and facilities are maintained in a very good condition in five years of occupation. Physical environment (building structure, facilities – mushala and playground) are in good condition, as shown in figure 2.

![Mushala and Playing Ground Condition](image)

Social activities are getting better, since there are more involvement of the neighbourhood community in terms of children education. The housing held an afterschool activity in the mushalla and house next to it for children both from the housing and the surrounding settlements. The teacher came from the Moslem Boarding School (Pondok Pesantren) nearby. Social relationship between the dweller and the neighbourhood are important in order to open the channel of information, so that more parties can support the housing, and also for the dweller to not feel secluded or isolated by the community.

Economic activities of the dweller in general are not different from the first years, because this is more related to the skill of the widow. There aren’t many supports in term of empowerment, so that they can improve their skills. The machines donated by the government were mostly neglected because they can’t find place to market the goods. The widow also mostly do not care much for finding a proper job, because they were more focussed on how to be able to get proper education for their children. There are now continuous scholarships from some NGOs for most (80%) of the children. For their daily life, the widow mostly dependant on donation and community charity.

Security is an important aspect of a settlement. In 2007, there was an incident that involves some groups of people due to misunderstanding of the Arba’ in house. Being a religious city, the social control of the citizen was very tight due to the religious practice. Arba’in house was suspected as one of the Syiah (a sect in Islam that was not favoured by most of the moslem in the city). The problems were resolved, and in relation to that, since 2007 the owner decided to settle one family of man-headed household in the housing. The man was hoped to be able to give help in case of emergencies, before a more proper treatment was available.

One of the assessment procedures in the Arba’in house was that every 5 years, the dweller was given an evaluation whether she has been able to support herself and her family. If so, then she must not extent her stay in the house and give the chance to other unfortunate widows. The 5 years period of
occupancy considered enough to give a chance to the widows to be able to settle their lives in terms of social and economic condition. The regional ordinance of Surabaya about rental walk-up flat also regulates 5 + 2 years policy to the renters. It means that they were allowed to stay 5 years, and addition of two years before they considered to be able to own a house. In the last five years, 10 women and her families had moved out, mostly because they were remarried or taken over by the extended family. Some moved out because they are breaking the rules, and two of them passed away due to aging. None of the women had moved out because of self-reliance yet.

4. Widow housing for better living

After 5 (five) years of occupancy, there are some improvements in the life of the widow, in terms of physical and social aspects, such as a better environment for living, more social relationship that opens lots of opportunities in term or earning money.

Housing infrastructure and facilities are maintained in a very good condition mostly because the dwellers are deeply concerned about the condition of their house and environment. Playing ground was carefully maintained in order to provide a safe place for their children to play and gather. Gutters are always clean, no rubbish was scattered, plants and flowers are nurtured so that influences the air quality and environmental health. The physical condition in 2004 and 2009 was shown in picture 3.

![Figure 3: Physical Condition in 2004 (left) and 2009 (right)](image)

Economic activities were supported by the house design, with open plan, a backyard and side access. These spaces were used as the place for cooking meals, sewing, planting, and other income generating activities. The potentials of the spaces however were not enough without the improvement of skills of the widow in order to maximize the output of the activities. There hasn’t been any training or workshop for the dweller in the past five years.

Compared to 2004, the access to information in 2009 is a lot better. This was proven by the amount of donation to the housing in terms of education fund for the children. Social relationship with surrounding community was maintained. Despite the 2007 incident, most of the dweller still consider the housing a more safe place to raise their children, compared to the place they were before.
5. Conclusion

The result of the study shows that in five years of occupancy, these women can improve their quality of life, with community as enabler, in terms of physical and social condition. The role of women due to reproductive and community managing work are assured. However, the productive role of the dweller needs to be improved, by injecting more empowerment support, both by public and private sector. It also need more research and elaboration about the causes of the lack of self reliance of the widows due to five years of occupation. By empowerment it is hoped that widows can improve and accelerate their productive activities and be able to sustain her life with the families towards a better future.

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Creating a Better Living Condition at the Floating House in Lake Tempe

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Abstract

Constructing a floating house whose lower structure supported by bamboo rafts was one of the Buginese traditional practices existing in Lake Tempe. Willingness to have easy access to fish-catching sites as well as simple way for fish processing and selling triggered the occupants, mostly fishermen, to build their houses over water in the form of floating house. The house was built in flexible forms and structures that could anticipate extreme climate changes at the lake, anticipate water tides at the lake, and enable living as well as economic activities as fishermen over water. The objective of this study was to find out the structural concepts of the floating house in anticipating macro and micro climate conditions over water as well as to observe flexibility of floating houses against water tides, its effectiveness to facilitate community living and economic activities, and their access flexibility inter houses and inter facilities, thus it may provide better living condition over water. The study employed qualitative method with an ethno-architectural approach while the analysis technique was the Spradley model. The study found that the concept of house whose lower structure supported by bamboo rafts was employed to adapt to indeterminable seasonal changes and had been effective housing solution during the period of overflow. The house structural system with low pillar enabled cool air to flow from space underneath the floor into upper parts of the house. During the overflow (rainy season) the floating house could be moved to the lakeside to avoid waves and strong wind as well as to ease fishermen’s economic activities. When water tide ceased (dry season), floating house would be removed to the middle where water is still available to let the house stay floating while the fishermen may still be able to catch fish. Meanwhile, the use of boat for transportation opened broader accessibility for catching and selling fish. Furthermore, the open building concept for floating house was applied to facilitate by time-room function changes in order to support daily life activities (husband, wife, and children) as well as to support fish-drying process so that the family economy might run well and living over water was better-suited. This study concluded that floating house with its form, function and the structure was able to adapt with macro and micro environment that enabled the fisherman to live properly and comfortably over water. Moreover, the
floating house also provided better accessibility to run economic activities and simplicity to do daily
activities.

**Keyword:** a better living, constructing, floating house
1. Introduction

In many ways, the architecture design pays less attention to tropical climate aspects to solve settlement problems both in urban areas and rural ones. Problems triggered by humid-hot tropical climate such as high rainfall and over tolerance-air temperature for comfortable, stinging solar radiation exaggerated by the global warming issues, soaring humidity, and the relatively slow air flow for comfortable thermal state, have not yet well been anticipated by urban planners or designers. The problems, however, disrupt the comfort and stability of the occupants’ lives in certain settlement. For this reason, friendly environment-architecture designs are expected to reduce the micro climate, hence resulting in comfortable thermal state in the tropical settlement. The comfort can be reached by promoting some aspects both inside the building and environment outside the building. Santosa (200) stated that on the study of hot environment, natural environment tradition - in this case is climate in specific tropical environment- and is used as starting point for adaptation of a building in the environment.

The traditional architecture manages to adopt building arrangement with simple architectural and structural comprehension while at the same time it is able to respond well to tropical climate based on hundreds years of experience. The open house is original design of the Indonesian traditional buildings which can be seen in the reliefs of Borobudur and Prambanan temples in Indonesia. Some previous studies found the use of the panggung house with wooden materials and saddle like-roof on the Bajo communities in some places in Indonesia. In addition to anticipate tropical climate, other reasons for the use are reliance on water for domestic activities and economy (making a living). These among others are found in Bajo community in Bajoe (Soesangobeng, 1977) and those who lived in Manado and Gorontalo (Robert Z, 2008). For the Bajos, the panggung house is permanently built over water to anticipate micro climate on the sea (harsh wind, and tidal waves) and to make a living over water. Other types of floating house available in Indonesia are rakit house in Musi river Palembang as well as panggung house and lanting house in the engagement of Barito river and Martapura river in Kalimantan (Jay & Rigg, 2002). The floating house is chosen to simplify economic and dwelling activities over water since water transportation system is smoother than that of in land.

In Irian Jaya (Papua), houses over water are found along Baliem Sirets river, the largest river system in the island. The river flows to Baliem valley, the settlement of the Danis, in the latitude of 1600 m over water surface. The Ndugwas and the Yalis, occupy the area, cut the sloping river, hunt fierce animals and collect forest products. The river water then passes the settlement of the Asmats. The Asmat community reside in panggung house close to the edge of the river - located 90 kms toward the upper course of the river. Traditional villages are located in the river tributary which is a good place for defence. Their needs on protein are gained from the river. Women catch fish while men hunt for turtles, crocodiles, and sharks. They collect drinking water during low tides when water is less salty (Rigg, 2002 : 93). This proves that since the past time, the panggung house has been used for settlement by Indonesian people.
The floating house architecture existing in Lake Tempe in Wajo Regency of South Sulawesi was one of the Buginese’s traditional architectures which employed friendly environment concepts and were capable of responding humid tropical climate. The settlement was floating and moving on the lake depending on environmental conditions outside the building and local climate (macro climate), while the condition inside the building is suited to meet health and comfort criteria preferred by its occupants (micro climate). The floating house was a panggung house whose lower structure made from raft to create micro climate setting in the building. The building arrangement spreading out and not attached to water, brought about low temperature due to high evaporation, created a good shadowing system, and provided space for air flow into the house. In addition this, the wall having no windows (wide openings) but having gaps or pores to proportionally flow air in and out the building, lead to more comfortable condition in the house. The use of raft for lower structure coupled with lifted floor for air circulation was a way to avoid the hot tropical climate over waters. The high saddle like-roof and its ventilation were capable of absorbing minimum heat in the dry season and of resisting minimum heat in the cold season as well. The floating house also used natural local materials - having good responsiveness as the buffer for the extreme macro climate over waters.

The architectural phenomenon of floating house construction in responding the micro climate from its surrounding environment was the occupants’ way to adapt with micro climate in their house. The floating house architecture in creating a better living condition over water is interesting to be analyzed, considering the specific architecture design and its lay-out and as one of Buginese’s traditional architectures which is environmentally friendly and has deep concerns toward the humid tropical climate in the lake water environment. A question put forward is: what is the architectural concept of floating house in Lake Tempe in giving the comfortable life for its dwellers and the surrounding environments?

Figure 1: The Floating House in Lake Tempe (Source : Primary Data, 2009)
2. Research methodology

This study employed qualitative method with architectural approaches (artifacts) and ethnography (settling customs). The ethnography approach was to figure out native residents’ point of view regarding their relation with the life, gaining view on their world (Spradley, 2006). The combination of these two approaches was expected to produce an ethno-architecture research whose outputs were not simply artifacts (physical trace of the settlement) but went deeper to discover the meaning of settling customs developed over water in relation to settling adaptation against the environment over water. For data analysis, Spradley Model (1980) was employed using multi stages analysis starting from domain analysis, taxonomy as well as componential and structural themes. The analysis model moreover was suitable to use for architectural approach and ethnography in order to find the meaning of the shifting settlement arrangement over water so that the research outputs would possibly relate settling behavior over water to settlement and space arrangements in the floating house in Lake Tempe.

3. The floating house in anticipating tropical micro climate

Santosa (2002) stated that one of the reasons why human beings made the building is that natural and climatic conditions do not always support their daily activities. Various human activities requires spaces having sufficient light intensity, supporting thermal condition whose air temperature in certain comfortable extent, and also low intensity disturbance audible condition that does not disturb the occupants inside.

To reach the thermal comfort when living over water, an environmentally friendly architecture design is required expected to reduce humid tropical macro climate by managing the environmental aspect outside the building (orientation, building density, settlement’s environmental arrangement).

3.1 Orientation

Egan’s orientation theory (1991) stated that the good direction to anticipate the hot condition of a building is stretching from the east to the west or vice versa. Frick (2006) furthermore elaborated that the building orientation should be made between the track of the sun and the wind to compromise between the houses located following the east to west direction and those following vertical direction toward wind’s direction. The building orientation is also needed to produce ‘the solar bag’, a condition where the solar radiation is on the lowest intensity following the sunrise and sunset cycles and the lowest sunshine angle. The shined areas therefore will be broader while its radiation intensity will be lower. The solar bag takes place after the sunrise until about 11.00 and at 4 .00 P.M. until sunset.

The floating house with single house model located to allow free move over water makes possible for the building orientation to be more flexible in its arrangement. Houses, which can be tied in a removable pole, make possible to manage the house orientation in order to avoid the heat effect and get minimum
radiation intensity. This however leads to shifting shadowing due to wind effect in certain time. But this does not significantly influence the house orientation as illustrated in figure 1.

![Figure 2: The orientation of the floating house suitable with wind direction (Source: Primary Data, 2009)](image)

**3.2 Building density**

Building density is the distance among buildings in the area which will affect the environmental temperature. High density area in general may have higher temperature than low density one. In the case of temperature, Lippsmeier (1994) stated that land areas will be twice hotter than the water areas in the same width. The water area will lose certain amount of its hot energy because of the evaporation. The high temperature is always related to low humidity while the moderate one related to high humidity. Eventually it is generally indicated that on the same crossing line and hot season, the lowest temperature takes place on the water surface while the highest on found in the land. On the contrary, it takes place in the other way in the cold season.

![Figure 3: Building Density at the Floating Settlement (Source: Primary Data, 2009)](image)  ![Figure 4: Typical Ventilation in the Floating House (Source: Primary Data, 2009)](image)

Floating settlement in Lake Tempe had low density level so that it retained lower environmental temperature as well. There were 115 floating houses located in a vast lake area following the water depth.
namely the depth of 0-1 m occupying 35.90 km², the depth of 1-2 m occupying 35.42 km², the depth of 2-2.5 m occupying 20.9 km², and the depth of 2-2.5 m occupying only 1.2 km (Naing, dkk., 2007). Considering the total vast watery area and composition of the existing houses, floating houses were able to freely move in groups and spread over the lake. This condition supported low air temperature setting over water surface with free air movement between the existing buildings.

3.3 Settlement’s environmental arrangement

The form and fine arrangement of the settlement environment will highly influence the wind speed. Due to the lot turnings, the wind speed brings about stronger wind blows or reduced speed. For the hot humid area, the settlement’s environmental arrangement allowing free vertical air movement is so demanded. This kind of arrangement will promote air blow to be maximally used as ventilation in the building. Meanwhile, the settlement’s environmental arrangement causing air move blocking due to the inhibiting medium causes suboptimal wind blow into the building (Golany, 1995).

The floating settlement arranged in spread or irregularly grouped patterns with big building distance makes the air freely move over the water surface without blocking just like that of in the high vegetations or other building areas. The vegetation surrounding the floating settlement is the thick leaf-water hyacinth which covers the whole surface of the lake water, functioning to absorb the surface heat so that it produces relatively cooler weather around the settlement area.

4. The concept of floating house in anticipating micro tropical climate

To switch macro tropical climate to be micro tropical climate able to produce thermal comfort inside the floating house, the most important factor to consider is the utilization of the sunshine for natural lighting and for preventing the produced heat by utilizing the form and elements inside the buildings such as the structure and construction, oversteak, and cross-ventilation.

4.1 Structure and construction

The structure of the building consists of three parts, the massive structure which is suboptimal for the climate affected- building, parallel wall plate structure in the climate affected building which specially needs to pay attention to wind direction and building structure frame which is optimal for the climate affected- building. As a kind of low pole panggung house, the floating house in Lake Tempe employed wooden frame structure. The main frame structure of the house was supported by rectangular pole taken from woods strong and effective enough to carry on the upper part of the floating house. This upper structure of the house was the medium to put the floor, the wall, and the roof together. The lower part on the other hand, made from chained bamboos, and was functioning as foundation over water. The fraction
between lower structure (raft) and the floor was lifted to provide space allowing the air to blow freely from lower part without making the high humidity effect.

The construction of the floating house’s floor of used flat planks and bamboos which were available in the surrounding areas. The floor was arranged in certain density to allow optimal air blow from the bottom. Materials from woods and bamboos used were environmentally friendly and able to adapt well to the tropical dry climate over water. The flexibility of the materials furthermore also provided warm effect during the cold weather and cold effect during the hot weather.

The wall was part of the house receiving much direct sunshine which through reflection and/or transmission processes sent to the house rooms. The wall could also be isolator from outside heat, protector from the outside rain crash and humidity, and also guard from outside wind flow. The floating house used massive walls, having wide space along the edge, front, and back sides of the house, to optimally absorb the heat during daytime. However, the wall density was arranged in such a way that still kept holes for natural ventilation. Moreover, on the side wall, pretty big hole and space were made between the wall and the roof functioning as the top ventilation to allow cold air blow during day time.

Figure 5: The structure and construction of the floating house in Lake Tempe (Source : Primary Data, 2009)

The roof was part of the house receiving highest radiation since it directly faced the sun. In this case, a partition was needed to reduce the sun effect to lower rooms. The roof was better constructed in simple saddle-like model without bunch to easily made dense rain drops. Therefore, the leaning roof (saddle-like) with partition (ceiling) would help cooling the room since the reflective partition under the roof would be able to reflect 90% of heat that flew to the house rooms. The roof of the floating house in Lake Tempe was generally triangle saddle-type roof with or without sufficient ventilation which facilitates the expected wind speed increasing. This type of roof, however, could still allow the existing heat to flow
downward through the pretty big hole located between the wall and the roof so that heat effect from the roof could be reduced. This would also directly reduce thermal condition under the roof.

4.2 Oversteak

The oversteak in the dry-tropical climate is used for light and open construction. The broad oversteak and front porch provide protection effect by blocking the blinded solar in the day time and preventing raindrops. Employing the open building concept, the typical Buginese floating house was equipped with open front and back porches as well as oversteaks in the front, sideways and back roof to prevent direct sun heat in the guess room so that it can be perfect room to take a rest on day time. The back porch, meanwhile, was used to protect the kitchen-used to keep fishing tools and household need utensil- from the afternoon sun rays. The oversteak had open and light construction because it was made of local wood. Despite so, it was strong enough to support the upper burden and the air burden. The width of the oversteak was approximately 1 meter, commonly covered by nipah leaves or iron sheeting.

![Figure 6: Oversteak in the Floating House (Source: Primary Data, 2009)](image)

4.3 Cross ventilation

The air movement inside the house is influenced by wind or temperature difference between the sun heat exposed - side and the protected one. In order to make the wind and room aeration run smoothly, an opening on the wall is needed to let the air moves not too slow or too fast. The type, position and size of the openings in upper and lower parts of the building may increase cross-ventilation effect. According to Lippsmeier (1977) the continuous room aeration in the humid tropical climate is particularly functioning to improve room climate. Mangunwijaya (1994) furthermore elaborated that the opening dimension to get natural ventilation for the family room, dining room, bedroom, and the like is considered good enough if at least reaching one-third of the floor width. In floating houses in Lake Tempe, some of them were equipped with some openings in the form of window. Some of which also had no windows but using a
wall design to control the in and out air flow. The wall, made from woods, was designed by arranging the wood chips in horizontal way, in not too close, and in a certain distance (space) to let the air flow freely infiltrate in between the holes of the wall. If using bamboos, the chipped bamboos were vertically arranged with sufficient density to let the air flow freely inside the house. This also allowed each part of the rooms to receive the best room freshing, causing the evaporation process to take place which can reduce the temperature of the human skin.

5. Economic and living activities

5.1 Economic activity

Economic activities done by the floating house community were mostly in informal sector, such as fishing, fish breeding, fish processing, and fish selling. The fish-catching activities in the Lake used boats with or without machine, at noon or in the evening. The fishing tools were casting-net and *Jabber* (fish snare made from iron), kept down the bottom of the lake during the night and taken up the following morning. The fishermen could freely do fishing in the lake for daily consumption and for sale. In fish-breeding activities, the fisherman bred their fish in the *Kerambah* encircled by *Belle*. The fish then would be harvested 5 (five) months later. The caught fish were divided into two types, wet fish to sell directly to collectors or local market and dry fish. As work separation, the women (housewives) played role to clean, preserve, dry, sell the fish as well as to sell the fish to collectors or traditional markets. The activities to clean and preserve the dried fish were done inside the floating house while the fish-drying activities were at the back of the house which is an open room without roof to let the fish receive optimal sunshine. Meanwhile, dry fish for consumption or sale were place at circular containers made of pine leaf matting. The production of fish was useful to fulfill the inhabitant’s daily-needs and also to pay education expense of their children. Besides for local consumption (Wajo Regency), the harvested fish from Lake Tempe were also sent to other regencies around Wajo.

Besides as fisherman, the inhabitants also earnt money by running small shop in their house and sold various basic-needs to the community, in addition to rent house to visiting tourists. This *Buginesse* traditional architecture built on the raft was interesting for foreign or domestic tourists. Other advantages of *Lake Tempe* were the beautiful panorama and the diversity of floras and fresh-water fish. In the afternoon, people can enjoy sunset whose ray was reflected over water while the fisherman drove up and down with their single machine –boats. Most of all, the unique of the house cannot be found in other places. One may go to the area of floating house by using boat about 30 minutes from the center of Sengkang, the capital of of Wajo regency.

5.2 Living (daily activities)

The open building concept, where the floating house was arranged in open, massive less partitioned, and prolonged from front to back parts, facilitated the occupants to do a variety of daily living activities such
as taking cares babies as well as domestic chores like sweeping, washing and taking bath. In the morning, men left the house for fishing by driving their single machine-boat and bringing their fishing tools while the housewife took care of the children and cleaned the house. Taking a bath, together with washing clothes and dishes, was carried out over the raft by using lake water. While excretion was executed in a small rectangular water-closet (about 1 sqm) at the backside of the raft separated from the house. This water-closet was made from wood or iron sheeting. Throwing out the rubbish or disposal to or around the lake was not allowed since it would contaminate the lake’s water. However, the water vegetation was encouraged to grow in order to function as a natural-sanitation system in neutralizing the lake’s water. Although the lake’s water was not qualified for cooking and drinking, but it was appropriate to use for washing and cleaning. Hence the drinking water and cooking water were taken from other areas in the land around the lake.

Activity to receive the guest was carried out in the frontage or in the center of the house that occupied half to ¾ part of the house wide. In General, the house apply the open concept, had no furniture at all, only mattress laid down as a place for sitting or taking a rest for guest. From the outside, this living room was reachable through main entrance and side entrance exist in every house. Inhabitans were so welcome to foreign and domestic guests visit Lake Tempe. The tourists usually left the floating house in the afternoon when the sunset took place or spent their night on the floating house and went back to the city of Sengkang in the morning.

Cooking activity was executed by the housewife and assisted by their daughter or other female family i.e grandmother or aunt. The kitchen was located behind the house in the back side. The kitchen tools available were the wood- fuel stove, oil- fuel stove or gas burner.

In the night, the fishermen caught fish and monitoring the fishing tools put around the lake. It usually took place till morning while the housewife and the child slept in the house over mattress. A bedroom in the floating house was only consisted of single room partitioned with clothes or thick paper for privacy area and also protecting them against the cold-weather. To protect them from mosquito, the dwellers used
the mosquito net (cloth with big pore) that had four corners to drape at wall, forming a tent within rooms. The situation was usually quieter at night.

6. Conclusion

- With the open building concept, the floating house in Lake Tempe was one of settlement alternatives for the Buginesse in Wajo regency who needed to anticipate the overflows in the land and to anticipate the macro and micro climate effect as well. Hence, the application of the concept allowed them to still carry out living and economic activities. The low-high tide of the water lake in the rainy and dry season made the floating house has to flexibly move and adapt following the physical condition of the lake.

- Still with its traditional Buginese architectural characteristics, the floating house was able to anticipate macro climate by arranging buildings’ density and denseness without blocking and using wide oversteaks and front and back porch to protect the direct sunshine and rain. Moreover, the house orientation was flexible (can be arranged as required) since the house needed only to be tied on single pole. This flexibility prevented the house from direct radiation during the daytime by turning the house view which enabled the activities there to run smoothly despite weather effects.

- Related to structure and construction in the floating house, the use of proper building elements was able to create micro climate inside the house rooms. The lower structure, raft whose floor lifted, was able to freely flow air from the underneath. Moreover, the wall construction, with its low density wall cavities and the placement of window holes as required, allowed the air around the building to flow in and out the wall holes which was able to create thermal comfort in the house. The triangle saddle roof structure also allowed optimal reflection of solar radiation which made the heat was not directly conveyed to the rooms under the roof, making the air temperature under the roof decreased. The use of the elements - adaptive to the environment and able to adapt with the tropical climate, made the floating house to be one of the architectural work alternatives possibly in creating a better living condition over water.

Reference


Residential Dynamics: The Co-existence of Formal and Informal Systems in Khartoum, Sudan

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Abstract

This paper looks at the residential dynamics in Khartoum, Sudan. Some patterns demonstrate that formal and informal systems co-exist and are mutually supportive. There are also particular spatial manifestations that have resulted from a unique socio-political situation. It is believed that informality is a legitimate energy within cities and for professionals of the built environment to make meaningful interventions; solutions need to emerge from the everyday realities of a specific context – thus avoiding blanket solutions. Many agents act on an environment at any given time and decision makers need to engage with that complexity. Enterprises emerging from informal settlements or through informal processes may be better suited to low-income groups, thus support of the informal sector might better address urgent need for poverty eradication. We are challenged as professionals to investigate beauty and efficiency in informality as an antithesis to a middle-class interpretation of how life should be lived. These issues are elaborated through the discussion of the situation in the city with an analysis of the various types of housing being produced centrally and in the peripheries.

Keywords: South Africa, Khartoum, informality, housing, urban environments
1. Introduction

It is generally assumed that formal and informal processes are strictly separated spatially. In Khartoum, Sudan the boundaries are less distinct. However, political unrest over many years has led to the sprawl of the city with informal areas now surrounding the city and changing the social dynamics in the peripheries.

Peripheral areas becoming highly disputed areas as the city expands and higher income groups move out of the centre thus displacing the poorer communities that have set up their settlements on the outskirts of the city.

2. Approach to informality

When urbanized poor people need homes they either acquire them through land invasions or they wait for government provided housing. Alternative solutions involve capacity building, saving schemes and job provision in a holistic approach which needs collaboration between diverse government agencies and more participation by various stakeholders. This would generate a complexity that needs alternative systems of governance.

Formalising housing and markets does not necessarily guarantee poverty alleviation and neglects the skills and knowledge that the poor may contribute to development. The reality is that informality appears to be faster and more efficient when it comes to providing for the needs of the poor. Formal mechanisms of housing delivery are too slow and unaffordable. Professional architects and housing practitioners need to position themselves in terms of various interpretations of development—this is critical in order to guarantee their effectiveness.

Because there is no security of tenure, people in informal settlements are reluctant to invest substantially to convert an informal dwelling into something more permanent. This often results in people living in structurally compromised buildings for years. This volatile nature of squatter settlements inhibits long-term development, thus professional interventions are essential.

While recognising some of the negative impacts of slums on cities and their inhabitants, for example the health and safety problems they may create, a pro-removal approach to slums neglects the fact that every informal structure, whatever its form, is in reality a home. Squatter settlements are not undifferentiated areas of squalor but dynamic environments with unique characteristics that need to be properly researched before any intervention is made. Slum upgrades are complex processes requiring the combined efforts of a number of disciplines.

While the relationship between the state, market and community is complex – how that relationship is conceived and managed is incredibly important to the progress of housing policy and practice. This relationship is crucial to the success of initiatives in housing and determines the degree of participation and accessibility to housing. The building of networks should be socially inclusive and
adopt a long term business plan rather than rely on short term project funding (Hamdi 2004: 108). The role of government should allow for innovation when the boundaries between public and private or formal and informal are blurred. This needs strong governance structures.

Huchzermeyer (2006: 21) summarizes state-society relations as being:

- oppositional (hostile, repressive or exploitative)
- indifferent (neglecting, tolerating or ignoring)
- cooperative (co-opting or integrating)

Hamdi envisions a re-imagined role for a state that regulates without interference (2004: 108). Cross (in Huchzermeyer and Karam 2006: 261) defines ‘communal governance’ as an informal, grassroots-based system built on face-to-face relationships and individual patronage. It is facilitated by a rural principal that land and building rights are allocated within the community, by the community, using social criteria in an adaptable and accessible basis. It competes directly with formal systems and is essentially an anti-bureaucratic system. She further explains how these forms of governance kick in and become active to replace failed formal systems – failure which at times would trigger violence and protest.

Hamdi (2004: 25) views this dynamic, an important resource for the poor, as being positive: “When agents like these, operating as they do, individually and informally coalesce and through their network act as a larger and single organization, when they are able to wield power and influence and become sophisticated, they emerge and become developmental.” The same author states: “We have begun to invent novel forms or civic engagement where government cooperates with, rather than serves, its citizens moving from provider to enabler, much as it has learnt to do with the market. New forms of mutual engagement are emerging everywhere; based on participation and social entrepreneurship which is finding its way into the body politic of governance. Turnbull calls this ‘Network Governance’; an inside out structure of social organizations and enterprises held together by well-connected and well-networked systems rather than command and control hierarchies or [the power elite]…” (ibid: 107).

He further explains how Turnbull debates the question “Who governs the city?” and how elusive the answer may be. The relationship between the state, market and communities has been viewed simplistically in the past; however communities are not a cohesive and integrated unit but are fragmented. A simplistic interpretation of markets and housing activity views two worlds that co-exist separately from each other when in reality the formal and informal feed into each other and overlap.

People living in informal settlement may be employed in the formal sector – while people living in formal dwellings may be very active in the informal sector. Physically, many types of informal dwellings are built on formal plots and as extensions and additions to formal structures.
Jenkins (in Huchzermeyer and Karam 2006: 87) elaborates on the nature of informality to include the physical (“land and house construction/redevelopment”), the social (“household structures”) and the economic (“informal access to resources”). Formal or informal activity may be a representation of survival strategies where poor households have multiple livelihood strategies (Smit in Huchzermeyer and Karam 2006: 104). Smit further explains that this diversity and complexity in livelihood strategies is reflected as family structures, built form and a determinant of decision making regarding day to day activity, including housing options.

![Figure 1: Housing activity happening at the interface between formality and informality.](image)

Trying to control and regulate these processes is a futile attempt. Even developed contexts have a degree of informal processes and activity; in some cases policy and practice is trying to accommodate for that rather attempting to stamp it out. Jenkins (in Huchzermeyer and Karam 2006: 85) argues that the concept of informality itself is “…rooted in an approach that is state dominated.” He views informal settlements (or informal responses and activity in general) as “…a socially legitimate response to real needs” representing some positive characteristics.

Development and participation, despite good intentions, are being conceived in the minds of the few, defying the very meaning of the terms. The solutions actually lie “out there” – and that is where research needs to be operating.

### 3. Control and choice in housing: a fine balance

Royston questions whether bridging the formal and informal is possible or even desirable, as he explains, while acknowledging that the poor are disadvantaged by informality, that formal systems may not work for the poor (Royston in Huchzermeyer and Karam 2006: 167).

Patterns of emergent systems in cities are indicators of real need and the imposition of pre-determined plans should be avoided as professionals become more sensitive to context. Hamdi (2004) explains how ‘small’ interventions grow and guide development and how the role of the professional becomes one of creating conditions for emergence and in this respect searching for catalysts. These catalysts
then generate a process of ‘negotiated reactions’ (Dewar & Uitenbogaardt, 1991), whereby continuous transformation is achieved within a stable environment. The built environment is not static: it is a complex relationship between stability and transformation (Habraken, 1998).

In squatter settlements transformations happen at an enormous rate compared to formal (more static) designed environments. Furthermore, the relationship between structural supports and detachable units is unclear. There is a degree of permanency in a squatter settlement—such as the layout of the site, but the overall set up is experienced as short term. Any design intervention will need to support a process in which speed of construction, changeability, affordability and transportability are important characteristics. Transformations will not only apply to structural elements but also to location and function.

Hamdi (2004: xviii) expresses the difficulty to determine the level of intervention to be implemented; he states that too much formal structure may inhibit personal freedom, limit progress, destroy the system it was built to serve, and only serve itself. He also explains how small initiatives which may “…lack a global perspective…” but are however important as their “…collective actions become ‘a natural part of the effort at social reconstruction’ and an effective way of managing cities.”

Harber (2006)\(^1\) explains how a squatter settlement develops in a process that is the exact opposite of a formal settlement: the land is occupied, buildings put up and services finally installed. He believes this usually generates an environment that is layered, develops gradually and is less disruptive to the existing site. This gradual, organic process is perceived as a common characteristic of successful urban places and is a quality found in vernacular settings.

A heightened sensitivity to various forces of urbanisation needs to be developed among practitioners and policy makers in order to strike a balance between stability and transformation: multiple levels of the environment where multiple agents may intervene in transforming their areas of control through complex decision-making, modification, adaptation and appropriation. This will contribute towards the generation of a layered and complex environment which fosters a sense of belonging, ownership and pride. This is direct opposition to conventional approaches to decision-making in the built environment which is a top-down process, strictly planned and rigid. This strict planning results in monotonous, fragmented, mono-functional environments and dis-empowers people (professionals and communities alike).

Within urban structures, the house is seen as a flexible/adaptable product rather than a fixed final product. Urban design as an inseparable component of housing acknowledges the various levels of the environment differing in the degree of permanence and changeability thus allowing for more involvement and affordability. This challenges our understanding of informal economies, settlements and structures and our role as professionals in interacting with these alternative systems and “ways of doing/living”.

\(^1\) Rodney Harber: personal communication.
Current debates regarding development, in general, and housing, in particular, attempt to position the issues in the broader perspective of the ‘south’, the African continent and new policy directions in South Africa. This would mean that an approach to informality needs to be appropriate to context and cannot follow the attitude of the developed world to informal systems where there is a high degree of government regulation.

4. Khartoum housing

The table below shows a portrayal of the various types of housing and housing processes in Khartoum, Sudan. In the last two decades Khartoum City has expanded considerably. With recent oil wealth becoming apparent, real-estate is booming with exorbitant prices. Due to the congestion of the older neighbourhoods of Khartoum, wealthier people are seeking refuge outside of the old city boundaries, competing with informal settlements, many of them inhabited by internally displaced people due to the political problems in other parts of the country.

Informality is very evident even in formal neighbourhoods with one dynamic being very unique to Khartoum: the many Sudanese working abroad send money to incrementally build homes in the capital city resulting in many building sites with buildings at various stages of completion being inhabited by guards and builders. This creates an interesting situation with people from different social classes living next to each other for many years.

The city also is changing character as a result of the influx of foreigners into the country after opportunities opening up with the oil industry. These, as well as tribalism issues among internally displaced people from areas of political conflicts, that now inhabit the peripheries are all opportunities for further research that have not been thoroughly investigated. There are also problems with social stigma arising from an inherited system of classifying residential areas as first, second, third or fourth class. However one positive aspect is that improvements in financial status usually imply developments within the same site irrespective of the classified class system. This happens informally in many cases and has led to shifting dynamics in many Khartoum neighbourhoods. This creates a different scenario when compared to people move from one area of the city to another which is perceived to be higher class. The latter creates greater divisions in society while the former creates more integration.
Table 1: A portrayal of the housing eco-system in Khartoum, Sudan with informal systems existing across all levels.

<table>
<thead>
<tr>
<th>Description/examples of residential area</th>
<th>Building materials + descriptions</th>
<th>Additional notes</th>
<th>Research opportunities</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Class</td>
<td>Predominantly reinforced concrete frames with infill brick panels. This defines the aesthetic of many neighbourhoods in Khartoum.</td>
<td>1st-3rd class funded through Al Bank Al ‘Agari or other banks; conditions minimum 3000 salary, guarantees as land. Gated communities as a new phenomenon.</td>
<td>Social dynamics created by incomplete homes. To what extent is there interaction between the permanent residents and the temporary residents (guards and builders) of first class areas?</td>
</tr>
<tr>
<td>Second Class 1960-2000) (employer-assisted or government built)</td>
<td>Reinforced concrete and brick construction. Sakan shaabi: semi-detached house 1 room+ kitchen+ bathroom/ toilet, 200-300m² repaid over a long period of time.</td>
<td>Site and service schemes have stopped since 2000. This has led to difficult access to land.</td>
<td>Reselling making land unaffordable. Current densifying is unplanned thus leading to problems of services not being upgraded accordingly. Sprawl is creating displacement of poorer segments of societies. Different classes having to co-exist causing social tension.</td>
</tr>
<tr>
<td>Third Class</td>
<td>Reinforced concrete or load bearing brick construction.</td>
<td>Current government supported programme: extra room added to existing house to the value of 10,000.</td>
<td>Social stigma associated with areas classified as third class. Home improvements: mix of income levels in the same area. Multi-storey buildings impacting on the use of open spaces.</td>
</tr>
</tbody>
</table>

Tradition Salha Load bearing Community initiated processes

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2 This table is not all inclusive and is merely based on a brainstorming exercise and impressions of a group of lecturers from Sudan University, December 2008. It will have to be revised with available statistics and other studies done on housing and urbanism in Khartoum.

3 Builders and guards creating different levels of income within the same area, informality in areas classified as first class. Lijaan shabiya issues certificate of residence to the guards to enable them to access schools and facilities.

4 Peoples’ Housing
Informal occupation of land later upgraded (Omdurman), Faki Hashim, AlIzbaa (Bahri), Laoota, Soba El Hila (Khartoum) structures, reinforced structures, 3-D panels such as the establishment of informal suqs: Laoota as an example. Servicing systems for upgrading.

<table>
<thead>
<tr>
<th>Informal</th>
<th>Initially informal occupation later upgraded and legalised, Mayo</th>
<th>Mud blocks strengthened by straw or manure. Plastered by zibala' for water proofing; Damuriya' as ceilings</th>
<th>Rent-a-bed (usually to immigrants from other African countries). Social dynamics between locals and foreigners. Installation of services. Alternative infrastructure.</th>
</tr>
</thead>
</table>

Figures 2 and 3: Typical “Ishash or shanty towns on the peripheries of Khartoum – construction using poles, mud, fabrics, tin or any other found material.

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5 Zibala is a mix of manure, adobe and straw.
6 These materials vary between areas; sometimes wire mesh is used on the external surfaces, then plastered, internal plastering sand with gum Arabic.
7 Damuriya is rough handwoven cotton traditional to the northern areas of the Sudan.
8 Referred to as “carton”, thus the name attributed to some of these areas.
Figures 4 and 5: More images of Ishaah that are literarily on the doorsteps of high income residential developments on the peripheries of the city.

Figures 6 and 7: The images show the typology that is quickly developing on the peripheries and causing disruption to existing squatter communities and traditional settlements in the same areas or in the vicinity.

Figures 8 and 9: Competition for land and potential for conflict is rife in these areas where the city is becoming overcrowded and thus expanding, further displacing poorer groups that are currently there.
5. Conclusions

This theoretical background and comparisons are the initiation of a research project and exploration being initiated which acknowledges informality as a legitimate energy within cities. It is believed that for designers of the built environment to be able to intervene in the development of cities in any meaningful way, they must arrive at solutions through the understanding of the unique everyday realities of a specific context – thus avoiding blanket solutions by acknowledging the many agents acting on an environment at any given time.

It is believed that enterprises emerging from informal settlements are more suitable for low-income groups and that support of the informal sector better addresses the urgent need for poverty eradication. We are challenged as professionals to investigate beauty and efficiency in informality as an antithesis to a middle-class interpretation of how life should be lived.

These concepts have not been explored enough in this particular context of Khartoum. This offers immense opportunities for research and creates a platform for debate and perhaps helps towards the creation of a vision for the city that accommodates the rich and the poor equally and advantages both.

This study is on-going.

References


Development of Housing Provision Policy in China

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Abstract

Housing reforms and strategies were tested and implemented in most countries during a long time to create better housing conditions. Although all of these reforms and strategies are targeted to upgrade the existing conditions, most of their impact on communities has not been very sufficient. In socialist China, although housing provision is considered to be the responsibility of the state, housing investment of the government is seen at the bottom of the planning agenda. Only a low amount of funds was channeled into urban housing investment, whereas a big amount of capital investment was put in industrial projects. As a result, serious housing problems have occurred. When the housing policy in East European countries is examined, a strategy to increase the role of the private sector in housing can be seen. Since the 1980s, the People’s Republic of China has followed a similar tendency in housing policy. In order to succeed in economic reform, commercialization and privatization of the public housing provision system have been used. However, housing privatization in China has more difficulties than those in the East European countries. This study examines housing provision policy development in China and evaluates its impacts on Chinese community. To implement the reform movement different strategies of housing reform were developed. These strategies can be divided in two part by their specific aims; as prevention and rehabilitation movements. Prevention strategies in Chinese Housing Reform especially aim to make easy to own a house by especially low income groups while rehabilitation strategies aim to upgrade the existing housing conditions. The study concludes that while these measures are put in practice, how urban community has been ignored—a component which is the fundamental to urban sustainability.

Keywords: housing provision, housing reform, China
1. Introduction

Housing reforms, as a component of economic reforms, have been launched since 1979 to redress the mistake by attempting commodification and marketization for the urban housing system in China (Zhu, 2000). Housing privatization involves an adjustment of the responsibilities of the government and a separation of housing provision from employment and the social benefit systems. Housing privatization, like reforms in other economic sectors, has to proceed within the communist political framework (Wang, 2001).

When the Chinese Communist Party came into power in 1949, a paramount task at the top of the new government’s agenda was to develop a new socialist China. Top-down control mechanisms for resource allocation were installed, facilitated by the nationalization of land, property, and other means of production. The state ownership of production means became a corner stone of the new governance. Private housing was gradually phased out by the government policy that forced it to be converted to state ownership (Zhu, 2000). The transformation of the planned housing provision as an in-kind welfare benefit to a more market-oriented housing provision is the ultimate goal of the urban housing reform in China (Mostafa and Wong, 1998) after 1949. Yet, during these transformation urban sustainability has not been taken into consideration.

The main goal of the study is to research what sort of influence political development have on sustainable urban development and transformation. Inspide of the fact that housing reform movement in China is known as the largest reform movement how it is turned out to be insufficient will be presented and to throw fresh light on housing provision policies in our country an evaluation will be done about these policies’ influences on Chinese society.

2. History of housing provision policy in China

From 1949 to now, China’s urban housing policy has undergone a number of profound changes (Mostafa and Wong, 1998). Due to the socialist principles and pervasive state ownership of properties, urban housing was taken as “welfare” distributed to workers according to their needs. The low-cost rental housing was consequently determined by the then low-wage regime. Owing to the misconception of housing as consumption goods rather than as a basic need of urban residents, investment into housing was given a low priority under the general planning framework that included promanufacturing factor-related investments (Zhu, 2000).

Chinese government housing intervention in economic development could be categorized into three major different stages (Table.1).
Table 1: Housing intervention of Chinese government (Source: Mostafa and Wong, 1998)

<table>
<thead>
<tr>
<th>Stages</th>
<th>Policy Measures</th>
<th>State Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Stage 1</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GDP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year 1950- RMB 2,243 million</td>
<td>In 1949- 1957, housing sectors were</td>
<td></td>
</tr>
<tr>
<td></td>
<td>partially nationalized and managed by</td>
<td></td>
</tr>
<tr>
<td></td>
<td>collectively or state owned enterprises, or</td>
<td></td>
</tr>
<tr>
<td></td>
<td>work units at the local level</td>
<td></td>
</tr>
<tr>
<td><strong>Stage 2</strong></td>
<td>Initial reform measures</td>
<td>Sharing responsibility</td>
</tr>
<tr>
<td>Socialist market economy (1978-1989)</td>
<td></td>
<td>among state, local government and work units</td>
</tr>
<tr>
<td></td>
<td>-Work units were allowed to invest in</td>
<td></td>
</tr>
<tr>
<td></td>
<td>housing for their employees.</td>
<td></td>
</tr>
<tr>
<td>GDP</td>
<td>-The sale of publicly owned housing was</td>
<td></td>
</tr>
<tr>
<td>Year 1978- RMB 27,281 million</td>
<td>carried out.</td>
<td></td>
</tr>
<tr>
<td>Year 1978- RMB 69,654 million</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Stage 3</strong></td>
<td>Market oriented housing measures</td>
<td>State Owned Enterprises</td>
</tr>
<tr>
<td>Rapid economic growth (1990-now)</td>
<td>under the control of local governments</td>
<td>(SOEs) play a vital role in the housing market</td>
</tr>
<tr>
<td>GDP</td>
<td>-The 1991 Housing Reform Programme</td>
<td></td>
</tr>
<tr>
<td>Year 1990- RMB 75,645 million</td>
<td>-Provident Fund Scheme was introduced</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-since 1991</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-National Comfortable Housing Project</td>
<td></td>
</tr>
<tr>
<td></td>
<td>was introduced (1993-1998)</td>
<td></td>
</tr>
</tbody>
</table>

The first stage was concerned about the welfare housing system under the planned economy before urban housing reform. The second stage practiced the socialist market economy and the welfare housing system was replaced by a pro-market approach (Mostafa and Wong, 1998). During the 1970s
and 1980s, it has been increasingly clear in many countries that the government cannot maintain the role of a direct producer of housing, and that this role must be performed by the formal or informal private sector. Marketization and commoditization became the main goals in the reform of China’s urban housing system (Meng et al, 2004). The introduction of urban housing reform changed the responsibility of state, local government and work units. Market elements were introduced in the housing system (Mostafa and Wong, 1998). China has undergone an important transition from an old system of allocating housing into a new system in which housing is provided by the market. The market is emerging as the main channel for housing supply. The housing sector has entered a phase of development led by demand.

It was the third stage that demonstrated by rapid economic growth, which was manifest to integrate both state and private sectors in a free market economy under local government planning measures. The most significant measure was the “Provident Fund for Housing”- a housing saving scheme. This measure aims to accumulate capital for housing production and consumption (Mostafa and Wong, 1998). The National Comfortable Housing Project was a housing project carried out by the central government from 1995 to 1998 as a very important instrument to push forward the reform of urban housing. During the period of the implementation of the National Comfortable Project, the old system of allocating welfare housing was still at work, but the new system of market housing was gradually taking shape (Meng et al, 2004).

When we look at the European countries, where there has been significant government intervention, three stages can be observed. In the first stage, governments concentrated on new construction to alleviate absolute shortages of housing by a range of direct provision and investment subsidies. In the second, the pressure was on reducing public expenditure and government involvement— and particularly on improving the management and maintenance of the existing stock, on increasing individual choice and on greater targeting of assistance. In the main this was accompanied by a range of deregulation policies aimed both at rented housing and at housing finance regimes as well as a shift from supply to demand side subsidies. In the third stage – in part as a result of the large-scale building programmes of the post war period - European countries are now entering a phase of upgrading housing provision within a broader programme of improving infrastructure and local services. They now appear to be moving into a fourth stage where housing plays a central role in ensuring the preservation of communities’ sustainability (Whitehead, 2008), while China tries to differentiate new housing reform policies from the old system policies. In this context it is clear that Chinese government has ignored sustainability of the urban development during these three stages.

3. Housing reform of China

To implement the reform movement, different strategies of housing reform were tested and applied. These strategies can be divided in two parts as prevention and rehabilitation movements. The most significant prevention strategies are housing provident fund, affordable housing, housing subsidy, whereas the most significant rehabilitation strategies are sale of public sector housing and new rental social housing.
Although all of these policies were aimed at the whole society, their impact on different social groups vary. And also it is important to recognize that, although housing reform in China has been referred to as the largest privatization programme this century, it is restricted to urban areas. It has very limited impacts on rural society apart from encroaching on large quantities of good agricultural land. (Wang and Murie, 2000).

The Provident Fund, appears to be a good idea to help the low-income families to save for housing. However, its impact is also limited to the better-off urban residents employed by the state sector, particularly the administrative and institutional organisations. The availability of this fund in enterprises depends on the performance of the enterprises themselves. It is very common for state enterprises to set up this system according to the government requirement, but only pay a very low rate. It takes a very long time for an employee in these enterprises to save enough money to buy a house. Many collective and private enterprises do not participate in this system and employees of these firms are excluded from this benefit. The development of affordable housing was aimed at the so-called medium to low-income groups, or the salaried groups. These groups mainly included the public sector employees of government departments and public sector agencies and institutions—the Chinese middle class. The subsidies associated with this type of housing were not available to the urban poor. These large, sometimes huge estates were designed for those who had a steady income (Wang, 2000).

Sale of public sector housing to the tenants, was certainly not targeted at the urban poor either. Collectives, small private sector firms, or enterprises that do not usually provide housing for their employees employ the poorest urban residents. Even in the large profitable state enterprises, sales tend to benefit those who are already living in public housing and have experienced no housing problems before (Wang, 2000). In addition to this, “building for sale programmes” was developed; but it was only possible for land-rich enterprises. Enterprises without spare land found it difficult to adopt this approach. More and more enterprises had to redevelop their older housing estates to enable “new build for sale projects” (Wang et al, 2005).

The idea of social house renting reflects a response to the increasing gap between different social groups and the emergence of large numbers of urban poor. The government anticipates that the very low-income group will include unemployed workers, particularly those who have been laid off by their employers through the restructuring of state-owned enterprises. The main condition for social renting will be that the family income will be below the officially defined local poverty line. It was anticipated that in the short term, the work units that employed these low-income families would provide subsidised rental housing. In the long term, the municipalities will play a major role in providing subsidised rental housing. As a quick response to the urban unemployment problem in large cities, this new policy was applied immediately to provide a safety net. For very poor families, the rent could be waived (Wang, 2000) (Table.2).
Table 2: Major current housing reform policies and their implications for the urban poor (Source: Wang, 2000)

<table>
<thead>
<tr>
<th>Major reform Policies</th>
<th>Poor among the official urban residents</th>
<th>Poor of the unofficial residents</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Workers laid off by state sector</td>
<td>Workers outside the state sector</td>
</tr>
<tr>
<td></td>
<td>Rural to urban migrants</td>
<td></td>
</tr>
<tr>
<td>Sales of Public Housing</td>
<td>Depends on access to work unit housing; those who have secured allocation in the past will benefit</td>
<td>Not applicable to the majority, apart from a few senior managers in the collective sector</td>
</tr>
<tr>
<td>Compulsory Savings (Provident Funds)</td>
<td>Applicable, but amount depends on the individual enterprises’ financial situation; some provide while others do not</td>
<td>Depend on the willingness of each individual employer; most private sector small businesses do not provide</td>
</tr>
<tr>
<td>Affordable housing</td>
<td>Qualified for purchase, but depend on individuals’s saving; most will find difficult to buy</td>
<td>Qualified for purchase; most low paid workers do not have enough savings and secured jobs for mortgage; small business owners could buy</td>
</tr>
<tr>
<td>Housing Subsidy</td>
<td>Only applies to those who were entitled to housing allocation</td>
<td>Not applicable</td>
</tr>
<tr>
<td>New Social Rental Housing</td>
<td>Applicable and the main target; may seek help from employer or government</td>
<td>Applicable, but could only rely on the municipal government</td>
</tr>
</tbody>
</table>
4. Conclusion

Experiences in other developing countries and Western industrialised countries indicate that housing is an important part of the urban economy and urban sustainability. A family’s housing problems cannot be solved without the improvement of the family’s economic situation. In most Developing Countries, housing does not only provide a shelter for the urban poor; it also provides an important economic base for the family (Wang, 2000). Housing reform in China is seen as the largest movement of the housing provision within the existing political system. According to Wang (2001), this reform is a major step toward the establishment of an urban housing market. However, strategies which are used, have followed a pragmatic approach and are very different from the quick privatization approach adopted by most Eastern and Central European countries. Wang and Murie say that (2000), although housing reform has brought significant challenges to the housing provision system and improved many urban residents’ living standards, it has not entirely broken the national system. They also specify that, market reform has been a partial reform, preserving some features of socialism and particularly the advantages of many members of the old political class.

Although Chinese government tries to solve housing provision problems with rehabilitation and prevention measures, as indicated by this study, some of the important aspects of the old system have survived and reform has had very different impacts on different social groups. As a result of this some part of the urban community have ignored. In spite of changing responsibility of the State, local government and work units by the urban housing reform, public support for housing have continued for so long. It is seen that following wrong policies does not only have influences on sustainable urban development but also have influences on physical, psychological and socio-economic urban community structure which will form the urban development. As in China, ignoring the communities, which will be the source of sustainability, will be one of the inappropriate policies that will be applied. When we look at the position of our politic environment it is clear that there are many lessons to be taken from Housing Reform movement applied in China --which we should take into consideration within other countries.

References


Initiatives for Transforming Informal Settlements into Sustainable Communities

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Abstract

Improvement of housing, infrastructure and physical environmental conditions seem to have been the focus of earlier approaches adopted to tackle the issue of informal settlements. Very little success has been achieved with such approaches as they are often unsustainable. There is a need for an integrated approach, which will not only consider the housing and infrastructure but will also take the social and economic sustainability of the communities into account. The paper presents a conceptual framework for holistic and progressive development in low-income settlements in Nigeria. It explores ways of integrating income generation, and social cohesion into low-income settlement improvement processes, while maintaining a healthy physical environment. It argues that the accumulation of social capital, and increase in income of the residents are key to the successful of housing delivery to the poor, and that it insures progressive development of the communities. The paper explores the role of the informal sector in income and employment generation for the economic sustainability of housing delivery. It advocates community based approaches to housing delivery with the help of None Governmental Organisations (NGOs) and Community Based Organisations (CBOs) to encourage user participation and foster social cohesion. A conceptual framework has been developed from an elaborate review of literature and case studies. The principles have been triangulated against primary data which was generated through a survey research in Abakiliki, Ebonyi State Capital in Nigeria.

Keywords: social capital; progressive development, holistic development, informal sector
1. Introduction

A slum is any part of an urban area characterised by inadequate access to safe water, sanitation, and other infrastructure; poor quality housing; insecure residential status; and overcrowding (U.N-Habitat, 2007). Although the term has been defined in various ways by different organisations to suit their working purposes, the main characteristics still remain as stated above. Nawagamuwa and Viking (2003) argued that rapid growth of slums could trigger a problematic situation if not recognised and prepared for, economically, socially, and environmentally. Slums are often prone to wide spread of diseases and criminal activities, which cause discomfort to both the residents and the entire urban area (Cairncross et al., 1990). This explains why the slum dwellers are sometimes erroneously perceived as the problem. However, it is important to note that people who reside in any slums and informal settlements are part of the general urban community (Ogu, 1996) and should be treated as such (Ng et al., 2001, Chan and Lee, 2007, Burra, 2005, Carmon, 1999). Slums should be improved primarily to better the lives of the poor residents and not just to maintain a decent environment.

The Federal Housing Programs; slum clearance and resettlement; World Bank-assisted settlement upgrading and site and services schemes adopted in Nigeria over the last six decades have recorded very little success (Ogu, 1996, Ogu and Ogbuozobe, 2001). The Maroko slum clearance in Lagos, Nigeria in 1990, involved the forced eviction of about 300,000 people without adequate arrangement for resettlement (Agbola and Jinadu, 2002, Olu, 1990). Some families were left homeless while some single women were forced into prostitution for survival. The interest was more on improving the environment with little attention paid to the social and economic issues. These are top-down approaches as argued by Muraya (2006). They were adopted under the assumption that communities were ignorant of their needs and lacked the propensity to take financial responsibility for services provided for them (UNCHS, 1989, World Bank, 1993). The attention has now moved to the enabling approach. Enabling is a bottom-up approach which promotes micro-level strategies stressing the need for community participation in the provision of shelter (Muraya, 2006, UNCHS, 1991). According to Goodlad (1994), bottom-up approaches afford households the opportunity to be involved, right from the planning stage, in deciding the type, amount, and quality of housing services to be provided. This can be achieved through the activities of Community Based Organisations. Nongovernmental organisations (NGOs) and Community based organisations (CBOs) are among the major actors in the housing sector and they play very important roles in enabling shelter provision for poor communities (Smets, 2002). Other actors include central, regional and local governments, the private sector (both formal and informal), and individual households (Muraya, 2006, UN-Habitat, 2005). NGOs are private, non-profit making, voluntary organizations, which focus on some defined aspects of development in the areas where they choose to operate, and are often funded through donations and grants from individuals, corporate organisations, international agencies and governments (Agbola, 1988, Fowler, 1987). CBOs are equally non-profit making and voluntary organisations, but their activities are usually limited to specific localities (such as neighbourhoods or housing areas), and they work towards improving the general quality of life in those places, while NGOs could be indigenous or international (Toyobo and Muili, 2008). CBOs function as direct representatives of the community groups, and thus get support from NGOs to facilitate their activities (UN-Habitat, 2006). The roles of NGOs in enabling include creating access to marginalised groups and areas; providing services and
skills that they are in short supply; developing efficient working processes to encourage grass-root participation in projects; ensuring maintenance of high standards in cost recovery, accountability, efficiency, effectiveness, and sustainability issues; creation and strengthening of CBOs; community empowerment and capacity building through training, motivation, and advocacy; mediating between CBOs and governmental and international authorities; and providing advice to government on policy issues (Muraya, 2006, Rahman, 2005, Smets, 2002, Ha, 2002). NGOs and CBOs have been instrumental in the success of slum improvement projects in several developing countries including Kenya, Bangladesh, and Philippines among others (Baker and McClain, 2008, Rahman, 2005, Merrill and Suri, 2007). This paper presents a conceptual framework for slum improvement and some recommendations for enhancing slum improvement activities in kpirikpiri slum in Abakaliki, Nigeria.

2. The informal sector

Although they are often unorganised, unregistered, and unregulated (Akintoye, 2008), the informal sector has filled the need gap created by the inability of governments and private enterprises to provide employment for large sections of the population in developing countries (Hasan, 2002). For instance, housing in slums is mainly by self-help as most of the residents cannot afford the cost of hiring external labour. It is estimated that about 30% - 70% of the housing stock in most cities of developing countries were built through self-help (Pugh, 2000). A vast majority of the poor urban dwellers in developing countries are employed in the informal sector as welders, food hawkers, carpenters, vulcanisers, shoe makers, photographers among others but they are often limited in their growth rate. This repressed growth has been attributed to legal insecurity issues, lack of access to credit facilities, limited access to raw materials, lack of managerial skills, and government policies on industrialisation and import (UN-Habitat, 1986). On the other hand, most informal industries use very crude and unsafe methods in production, with little or no attention paid to health and safety. For instance, in Karachi, the largest city and financial capital of Pakistan, it was reported that garments, carpets, car and machinery spare parts are produced in and around informal settlements (Hasan, 2002). Some of these industrial activities are prone to explosion and some involve the use of poisonous chemicals, which could be injurious to health. The task at hand is therefore how to organise, regulate, and support the informal enterprises to create employment, enhance the earning power of the urban poor, while ensuring a safe, healthy and socially acceptable environment (Nwaka, 2005). This paper goes on to discuss issues that should be addressed in slum improvement programmes to achieve the desired outcome. Some recommendations have also been made based on an ongoing research in Abakaliki, Nigeria.

3. Social, economic and environmental concerns

An integration of economic, social and environmental considerations is crucial for arresting negative synergies, building positive ones, and for encouraging good development (Basiago, 1999). Therefore, the integration of the following three major facets of the urban community presents a holistic approach, which will ensure sustainability in urban development.
3.1 Social issues

A healthy social environment is one characterised by good quality of life, harmonious living, and reduced social inequality (Enyedi, 2002). Socially cohesive groups are often more strongly motivated to contribute to the group’s welfare, to advance its objectives and to participate in its activities (Cartwright, 1968). Such communities are also known to be richly endowed with stocks of social capital (Kawachi and Berkman., 2000). By way of definition, social capital refers to features of social organisation such as levels of interpersonal trust and norms of reciprocity and mutual aid, which act as resources for individuals (Coleman, 1990, Putnam, 1993). Creating social capital is a necessary requirement for fostering communal actions which are vital for progressive development (Narayan and Pritchett, 1997). Social capital is created through processes of learning interaction, and planning and implementation of community projects could provide such opportunities (Hobbs, 2000, Falk and Kilpatrick, 1999). The ability to maintain social order, solidarity, trust, reduction in wealth disparities and strong attachment to place will result in productive potentials being identified and harnessed for the collective use of the community (Easterly et al., 2006). Low-income settlement improvement will then cease to be just a project with a limited life span but a continuous development process.

3.2 Economic issues

Poverty is the main barrier to successful delivery of housing to low-income households (U.N-Habitat, 1989). One of the major challenges of low-income housing delivery has been cost recovery, which is necessary for the establishment of replicable housing projects and sustainable housing finance systems (Kamete, 2000). This explains why private investors are often disinclined to investing in low-income houses (Mukhija, 2004). The ability to maintain the required monthly payments is strongly tied to the earning power of the recipients. This situation could be ameliorated by incorporating income generation and employment creation measures into low-income housing and informal settlement improvement processes from the design stage (UN-Habitat, 1986). Governments could partner with Nongovernmental Organisations to provide managerial and business accounting skills necessary for organising and supervising expanded production proprietors of informal enterprises in the project area (Rahman, 2005). This will facilitate business expansion and minimise the rate of avoidable closures.

3.3 Environmental issues

Local environmental quality covers aspects of air and water purity or pollution, noise levels, access to open space, the visual effects of buildings, and the potential effects which such characteristics may have on physical and mental health (E.E.A., 1995). Other aspects of local environmental quality include land quality, light and radiations levels, sanitation, solid waste disposal and drainage (Solomons, 2003, Moore et al., 2000, Reiter et al., 2006, Ilyinskikh et al., 1996, Carmona and Magalhaes, 2007). Informal settlements are often associated with haphazard developments resulting in disorderly and unhealthy environments (Nwaka, 2005). A positive quality is created by ensuring a hygienic, green, and unpolluted, visually pleasing physical environment. Informal settlement improvement plans should be aimed at delivering durable structures connected to basic utilities (such
as tap water, electricity, and sewage facilities), and having sufficient living space (UN-Habitat, 2004). This will minimize amount spent on health services and in turn prolong life.

4. Conceptual framework for slum improvement

A conceptual framework has been derived from a theoretical perspective established from literature, and case studies of projects in other developing countries. The framework contains sets of possible actions to deal with the issues facing the slums. Part of the framework has been presented in table 1 below.

Table 1. Conceptual Framework for achieving holistic and progressive development in low-income settlements:

<table>
<thead>
<tr>
<th>Proposed Actions</th>
<th>Social Impacts</th>
<th>Economic Impacts</th>
<th>Environmental Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Promote education in the community (Easterly et al., 2006, Heyneman, 2003).</td>
<td>Social capital creation and increased positive social mobility.</td>
<td>Access to better jobs and better entrepreneurial skills.</td>
<td></td>
</tr>
<tr>
<td>Encourage social events with the help of the residents. (Hilber, 2007, Ellickson, 1991, Ostrom, 1990).</td>
<td>Stimulation of continuous community interaction</td>
<td>Boost local retail activities</td>
<td></td>
</tr>
<tr>
<td>Provide training on lacking technical and managerial skills (UN-Habitat, 1989).</td>
<td></td>
<td>To boost economic activities and job creation.</td>
<td></td>
</tr>
<tr>
<td>Non Governmental Organisations (NGOs) and CBOs to negotiate long term Loans, and Government subsidies (UN-Habitat, 1986).</td>
<td></td>
<td>Affordable credit facilities.</td>
<td></td>
</tr>
<tr>
<td>Provide appropriate design standards for infrastructures and houses, which will encourage labour intensive methods in both construction and maintenance (UN-Habitat, 1989).</td>
<td></td>
<td>Job Creation and lower building and maintenance cost.</td>
<td>More affordable and low maintenance buildings. Easy access to Building materials.</td>
</tr>
</tbody>
</table>

5. Study methodology:

The primary data collection was conducted in the form of a sample survey in Kpirikpiri slum in Abakaliki, Nigeria occupied by about 1420 households. This involved the use of a survey schedule developed from the conceptual framework. The survey strategy was adopted for its advantage in
ensuring a high quality data, and a wide and inclusive coverage (Denscombe, 2007). A pilot was first conducted and necessary adjustments made to the schedule to improve its effectiveness before the main survey. The survey involved 142 respondents representing 10 percent of the total number of households in the area. To ensure an even spread of the sample, the systematic sampling technique was applied in selecting the respondents.

6. Discussion:
A general overview of the survey results indicates that the residents seemed to be satisfied with the conditions of their homes and immediate environment in spite of the deplorable state of the buildings. About 42% of the residents share toilet facilities with more than one other household as shown in figure 1 below. This is unhygienic and below acceptable standard of a maximum of two households (UN-Habitat 2004). According to Cairncross et al (1990), sharing toilet facilities with too many people (more than one household) makes the people susceptible to diseases such as diarrhoea, dysenteries and typhoid. The houses also had major cracks on the walls, leaking roofs, and windows too small to allow for adequate ventilation. This is an indication of the residents’ lack of understanding of the value of adequate hygiene and safety of their homes. Another reason deduced for their responses is the fear of government intervention, which often results in eviction and demolition exercises.

Figure 1: Rate of sharing Human waste Disposal Facilities in Kpirikpiri (Field survey, 2009)

There is a significantly low level of trust in the civil authorities among the residents as evidenced in figure 2 below. The levels of trust have been graded from 1 to 5, representing the lowest to the height respectively. The people seem to have lost confidence in the authorities as a result of past incidents of non fulfilment of promises. According to Ogu and Ogbuozobe (2001), several attempts by Government to provide housing for the Nigerian masses have benefited mainly the elitist and the middle class while the poor are left to fate. Such a trend is capable of undermining public confidence in the authorities over time.
There is a low level of participation in organised social groups and associations among the residents as shown in figure 3 below, with the exception of religious groups, which has a relatively high level of participation. Informal social relationships are more acceptable to the residents than formal associations. This has implications for social cohesion and community action required for progressive development in slums (Putnam, 2000, Forrest and Kearns, 2001). There is a need for communities to work together in organised groups to ensure adequate maintenance of public utilities and infrastructures and for progressive community development. Community action has proven to be effective in slum improvement programmes in various parts of the world. There have been reported cases of improved wellbeing of slum dwellers in Indonesia and Tanzania, through community involvement in organised saving and loan activities (UN-Habitat, 2008).

Only about 20% of the residents have Home Based Enterprises as shown in figure 4 below. This is a viable source of household income, often managed by women. HBEs account for over 70% of the urban employment in Nigeria (Abumere et al., 1996). Tipple (2005), confirmed the effectiveness of HBEs in poverty alleviation from his works in some low income neighbourhoods in Cochabamba, New Delhi, Surabaya and Pretoria. Households with one source of income will struggle to meet their basic needs and thus would be unable to embark on any self help home improvement projects.
7. Recommended actions

The foregoing section points to the need for a pragmatic approach towards improving the lives of the residents. Some recommended been made below.

- Community capacity building programmes with particular emphasis on community: This will involve educating the residents on hygiene and other health related issues and the need for improvements. It will also provide a forum to introduce recent developments in self-help building and the benefits to the people far ahead of the time spelt out for the commencement of any building or infrastructural projects. Slum improvement activities will be more effective if the residents are sociologically prepared in advance. Non-Governmental Organisations (NGOs) will be in a better position to facilitate this process and to work towards creating Community Based Organisations (CBOs) in the course of the programme.

- Involvement of indigenous NGOs in slum improvement: There are currently no indigenous NGOs involved in slum improvement in Abakaliki. For instance, the Ebonyi State World Bank Assisted Community-Based Development Project is currently being executed by Government officials working in World Bank assisted project offices (World Bank, 2005). If improvement projects are carried out through indigenous organisations, there will be greater impact. This is because the people will be more willing to cooperate with independent indigenous organisations with no links to Government. Their activities will be monitored by the relevant foreign agencies to ensure accountability.

- Provision of micro-credit finance to women for Home Base enterprises: Training will be provided by NGOs through community capacity building programmes. The enterprises will be under close monitoring to ensure good management and accountability.

8. Conclusion

Very little achievement has been recorded in the numerous attempts by public authorities to improve the living condition of poor urban dwellers. The World Bank is encouraging governments to initiate policies that would enable the housing market function effectively but the urban poor do not have the required bargaining power to participate in the market. The major limitation to their involvement
remains poverty. This situation requires an approach which will ensure that income generation is made an integral part of low-income housing delivery programmes while maintaining a socially cohesive and healthy physical environment. This is necessary for progressive, physical and economic development. The informal sector has a major role to play as most of the urban poor are engaged in such activities to earn a living. Public authorities will need the assistance of NGOs and CBOs who will work directly with the communities for technical support. Further research is required to develop an effective plan for providing credit facilities for housing and other income generation. There is also a need to examine policy issues that may arise on account of some of the proposed courses of action. The research is still in progress and more issues and recommendations will be discussed in due course.

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Slum Upgrading: Assessment of the Kibera Decanting Site Building Typologies

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Abstract

Slum upgrading efforts in Kenya are a priority to the government in a bid to stem the spread of informal settlements within the urban areas. The main concern is to provide affordable housing, and supporting physical infrastructure to better living conditions for the inhabitants. The Kibera decanting site, characterised by high-rise buildings, is the latest upgrading scheme by the government to address this problem. Assessment of this site buildings is done through simulations (performed with EnergyPlus) to evaluate the indoor thermal environment produced by the construction techniques and typologies employed. Passive cooling strategies like varying the window sizes and adding shading devices are simulated for Mombasa and Kisumu, which have different climate conditions. Results indicate that similar sites may be constructed in Kisumu and Mombasa by utilising these strategies.

Keywords: cooling strategy, decanting site, upgrading
1. Introduction

Kibera slum is located seven kilometers southwest of Nairobi. It consists of twelve villages which occupy approximately 256 hectares (630 acres) of government land. Population estimates vary widely from 700,000 to 1.2 million. The Ministry of Housing estimates 18,127 structures within the slum area, each comprising a minimum of five households. UN Habitat estimates population densities vary from 1360 to 3320 persons and 55 to 250 structures per hectare.

In its endeavour for upgrading the government embarked on a rigorous task by constructing a decanting site adjacent to Kibera, in collaboration with UN habitat and other donor agencies. Its aim is to offer a temporary holding center for slum dwellers during the villages upgrading: afterwards they will be relocated to the new dwellings. Figure 1 below shows the decanting site (circled in red) in relation to Kibera slum.

Figure 1: Aerial photo of Kibera slum and of the decanting site (circled in red) related to Nairobi area.

1.1 Decanting site

The Site is located at Langata across the slum settlement adjacent to the Raila village. It measures 2.00 Hectares and consists of 17 blocks of 5 storeys flats with a total of 600 three-roomed self combined units. Already the first batch of Soweto village has moved to the decanting site by October 2009, and upgrading exercise has begun in their village. The buildings are constructed using concrete blocks and colour coated GCI sheets.

Figure 2 below shows the site plan of the decanting site and a photo of completed blocks.
2. Case study description

The blocks of the decanting site are characterised by varying shapes and orientation and different relation with the surroundings. In order to check the differences between the different orientations, three specific buildings were selected as indicated in Figure 3. Moreover, the geometry of the buildings on the site was modelled as plain shapes with pitched roofs, and were characterised by a general surface reflection factor of 0.2 (default value used by EnergyPlus).
2.1 Geometry

Some assumptions were made on the building geometry: the modelled 5 storeys building is set with a rectangular plan, with a net surface area of 60 m\(^2\) and a net volume of 180 m\(^3\). The fenestration covers 15% of the vertical walls and is not provided with any local shading. Internal partitions were simulated as 115 m\(^2\) of internal thermal mass (Figure 4).

![Tri-dimensional representation of the building geometry.](image)

2.2 Construction

The basic constructions with consequent U-values used in the calculations are as follows:

- external vertical walls: 20 cm heavyweight concrete blocks (2.84 W/m2K);
- windows: single pane with wooden frame (5.00 W/m2K);
- slab: 20 cm concrete built directly on the ground (3.08 W/m2K, calculated according to ISO 13370) - the monthly temperatures of the ground have been calculated by the means of the "slab" tool embedded in the simulation software;
- unconditioned roofspace: covered by a 1 mm pitched red painted corrugated iron sheet (GCI) and separated from the conditioned space by 8 mm of cardboard (global U-value of 7.14 W/m2K, calculated according to ISO 13789);
- internal floors: 20 cm concrete (2.28 W/m2K);
- internal thermal mass: 15 cm heavyweight concrete blocks.
The detailed materials data used for the model buildings have been derived by ASHRAE (2001) and are listed in Table 1.

Table 1: Material properties used in the simulations.

<table>
<thead>
<tr>
<th>Material</th>
<th>Conductivity [W/(m K)]</th>
<th>Density [kg/m³]</th>
<th>Specific Heat [J/(kg K)]</th>
<th>Surface coefficient Absorption</th>
<th>Emissivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete blocks</td>
<td>1.63</td>
<td>2300</td>
<td>880</td>
<td>0.60</td>
<td>0.88</td>
</tr>
<tr>
<td>Concrete</td>
<td>1.16</td>
<td>2000</td>
<td>880</td>
<td>0.60</td>
<td>0.88</td>
</tr>
<tr>
<td>Cardboard</td>
<td>0.07</td>
<td>1000</td>
<td>1300</td>
<td>0.50</td>
<td>0.60</td>
</tr>
<tr>
<td>Red Painted GCI</td>
<td>112.00</td>
<td>7200</td>
<td>390</td>
<td>0.50</td>
<td>0.50</td>
</tr>
</tbody>
</table>

In order to test the situation at any level, the simulated flats are located on the first (ground) floor, third floor and fifth floor, whose global thermal characteristics are summarised in Table 2.

Table 2: Global thermal characteristics of the reference flats.

<table>
<thead>
<tr>
<th>Reference Flat</th>
<th>Average U-Value [W/(m² K)]</th>
<th>Average Frontal Mass [kg/m²]</th>
<th>Total Heat Capacity [MJ/K]</th>
</tr>
</thead>
<tbody>
<tr>
<td>First (ground) floor</td>
<td>2.44</td>
<td>392.86</td>
<td>76.75</td>
</tr>
<tr>
<td>Third floor</td>
<td>2.88</td>
<td>392.86</td>
<td>76.75</td>
</tr>
<tr>
<td>Fifth floor</td>
<td>2.88</td>
<td>286.91</td>
<td>56.25</td>
</tr>
</tbody>
</table>

Considering the purpose and the economic investment for the decanting site, a poorly sealed building is assumed, with a constant infiltration rate of 1 air-change per hour (ach), with additional 3 ach set as passive cooling device, activated when the indoor air temperature exceeds 26°C and the outdoor temperature is lower than the indoor.

2.3 Internal heat sources

Table 3 gives the summarized internal heat loads as calculated for the decanting site buildings and inferred from ASHRAE (2001).

Table 3: Internal heat loads characteristics for the modelled buildings.

<table>
<thead>
<tr>
<th>Heat source</th>
<th>Reference value</th>
<th>Daily Schedule</th>
</tr>
</thead>
</table>

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2.4 Climate

The original decanting site location is Nairobi, on Kenya highlands, which is characterised by a mild climate, with average monthly temperatures varying between 10°C and 23°C.

The government has embarked in a campaign to upgrade all the national slum areas, and so it is easy to expect the future planning of other decanting sites with similar characteristics even in other areas of the country. In order to take into account this chance, the performance of this kind of buildings was assessed in relation to other climatic conditions, too.

The location chosen were Kisumu, based in the western part of the country on the shores of lake Victoria, which has a generally warmer climate, with a wider yearly temperature amplitude (the monthly averages fluctuate between 14°C and 35°C), and Mombasa, at the coast is characterised by a very hot and humid climate (average monthly temperatures between 20°C and 34°C, with average relative humidity of 74%).

3. Comfort assessment

Principal purpose of buildings, conceived in both their construction and system elements, is to provide conditions for human thermal comfort, which is defined as “the condition of mind that expresses satisfaction with the thermal environment” (ASHRAE, 2004). In the last decades a lot of emphasis has been laid on the means to assess the global performance of buildings, which has brought about the creation of several protocols, procedures and indices which try to define the quality level of buildings.

The most adopted performance indices usually refer to the energy use, and mostly depend on heating, cooling and ventilation needs of the buildings. Informal settlements' buildings are rarely provided with HVAC system and therefore have no significant impact on energy consumption (Yannas, 1996). Therefore, the performance of such buildings is usually assessed considering the impact of indoor environment to occupants, represented by the thermal comfort level achieved inside the building.

Buildings without HVAC system are normally referred to as "naturally ventilated buildings", and the general indoor thermal comfort can therefore be assessed by the adaptive thermal comfort model, since it has been developed specifically for this kind of buildings located in extremely warm climates.
(DeDear et al., 1997). Its basic principle is that the occupants' thermal sensation is strongly influenced by their expectations upon their long-term and short-term thermal experience.

In this work the equation developed by DeDear et al. (1997) for ASHRAE (2004) has been adopted to calculate adaptive temperature limits, while its interpretation given by Van der Linden et al. (2006) for the Dutch ATL (Adaptive Thermal Limit) standard has been considered concerning the boundary conditions (Table 4).

**Table 4: Adaptive temperature limits.**

<table>
<thead>
<tr>
<th>Acceptability Range</th>
<th>Lower Limit</th>
<th>Upper Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>90%</td>
<td>$T_{op}&gt;17.80+0.11T_{e,ref}$</td>
<td>$T_{op}&lt;20.30+0.31T_{e,ref}$ if $T_{e,ref}&gt;12^\circ$C</td>
</tr>
<tr>
<td></td>
<td>$T_{op}&lt;22.70+0.11T_{e,ref}$</td>
<td></td>
</tr>
<tr>
<td>80%</td>
<td>$T_{op}&gt;17.05+0.11T_{e,ref}$</td>
<td>$T_{op}&lt;21.30+0.31T_{e,ref}$ if $T_{e,ref}&gt;12^\circ$C</td>
</tr>
<tr>
<td></td>
<td>$T_{op}&lt;23.45+0.11T_{e,ref}$</td>
<td></td>
</tr>
<tr>
<td>65%</td>
<td>$T_{op}&gt;16.55+0.11T_{e,ref}$</td>
<td>$T_{op}&lt;22.00+0.31T_{e,ref}$ if $T_{e,ref}&gt;12^\circ$C</td>
</tr>
<tr>
<td></td>
<td>$T_{op}&lt;23.95+0.11T_{e,ref}$</td>
<td></td>
</tr>
</tbody>
</table>

Reference outdoor temperature ($T_{e,ref}$) is the running mean temperature that is an exponentially weighted mean of the daily air temperature days prior the one considered, up to one week of delay, which aims at representing the short-term thermal experience of the occupants. Standard EN 15251 (2007) defines it by the means of the following equation.

$$
\theta_{rm,n} = \frac{0.8 \theta_{dm,n-1} + 0.6 \theta_{dm,n-2} + 0.5 \theta_{dm,n-3} + 0.4 \theta_{dm,n-4} + 0.3 \theta_{dm,n-5} + 0.2 \theta_{dm,n-6}}{3.8}
$$

Where:
- $\theta_{rm,n}$ is the running mean temperature in the $n^{th}$ day [$^\circ$C];
- $\theta_{dm,n-1}$ is the daily mean temperature in the $(n-1)^{th}$ day [$^\circ$C].

Moreover, the standard suggests a way to evaluate the long-term building performance through dynamic simulations of calculating the discomfort degree-hours. These are the sum of all the hourly temperature differences between the indoor operative temperature as calculated by the software and the upper and lower boundaries for the comfort conditions, and can be considered equivalent to the potential climatization need and to the related energy consumption.

Another interpretation used in this work calculates the year time (represented as percentage of hours on the whole yearly hours) that falls into the different acceptability ranges, in order to understand how poorly the indoor environment affects the occupants thermal sensation.
4. Simulation results

The base buildings simulated are characterised by the discomfort degree-hours shown in Table 5, while Table 6 represents the amount of time falling beyond the 65% comfort acceptability range.

Table 5: Discomfort degree-hours calculated for the reference buildings and flats, on the basis of the 90% acceptability range limits.

<table>
<thead>
<tr>
<th>Building</th>
<th>Floor</th>
<th>Kisumu</th>
<th>Mombasa</th>
<th>Nairobi</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>First</td>
<td>350.97</td>
<td>3 767.72</td>
<td>4.41</td>
</tr>
<tr>
<td></td>
<td>Third</td>
<td>4 352.10</td>
<td>15 469.53</td>
<td>475.24</td>
</tr>
<tr>
<td></td>
<td>Fifth</td>
<td>6 696.35</td>
<td>15 286.02</td>
<td>1 107.01</td>
</tr>
<tr>
<td>02</td>
<td>First</td>
<td>42.06</td>
<td>1 127.05</td>
<td>76.32</td>
</tr>
<tr>
<td></td>
<td>Third</td>
<td>1 799.64</td>
<td>9 386.76</td>
<td>175.79</td>
</tr>
<tr>
<td></td>
<td>Fifth</td>
<td>5 754.24</td>
<td>13 657.74</td>
<td>1 004.90</td>
</tr>
<tr>
<td>03</td>
<td>First</td>
<td>439.60</td>
<td>2 507.99</td>
<td>21.96</td>
</tr>
<tr>
<td></td>
<td>Third</td>
<td>3 902.27</td>
<td>12 080.91</td>
<td>363.77</td>
</tr>
<tr>
<td></td>
<td>Fifth</td>
<td>5 922.99</td>
<td>14 326.64</td>
<td>730.26</td>
</tr>
</tbody>
</table>

Table 6: Percentage of the yearly time falling outside any comfort range (<65% acceptability) for the reference buildings and flats.

<table>
<thead>
<tr>
<th>Building</th>
<th>Floor</th>
<th>Kisumu</th>
<th>Mombasa</th>
<th>Nairobi</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>First</td>
<td>0%</td>
<td>6%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>Third</td>
<td>11%</td>
<td>50%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>Fifth</td>
<td>20%</td>
<td>46%</td>
<td>2%</td>
</tr>
<tr>
<td>02</td>
<td>First</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>Third</td>
<td>4%</td>
<td>30%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>Fifth</td>
<td>16%</td>
<td>41%</td>
<td>2%</td>
</tr>
<tr>
<td>03</td>
<td>First</td>
<td>0%</td>
<td>3%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>Third</td>
<td>9%</td>
<td>39%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>Fifth</td>
<td>18%</td>
<td>44%</td>
<td>1%</td>
</tr>
</tbody>
</table>

The results show how the planned buildings perform well in Nairobi, where the site is actually located and where there is a milder climate, while in Mombasa, which is characterised by warmer climates, the situation is much worse.

Also noted is the lack of significant difference between the three analysed buildings, which differ mostly on orientation, but the top (5th) floor generally has worse performance than the other levels, since it is most sun-exposed and has the lowest thermal mass.
Considering the above, some low-cost passive cooling strategies have been analysed, to understand what minor changes can be made to the original project in order to reconstruct similar sites in regions with different and more extreme climatic conditions. Poor performing 5th floor flat of building 01 is chosen for passive cooling analysis.

The first basic strategy consists in changing the amount of glazed surface on the envelope: if the baseline is the 15% of the external vertical walls, as previously said, both a reduction to 7% (which is equal to 1/10 of the floor area) and an augmentation to 30% have been considered. The results are shown in Figure 5 below.

![Figure 5: Discomfort degree-hours for the flat on the fifth floor of building 01, according to the different fenestration percentages considered.](#)

Predictably, the number of discomfort degree-hours increases as the glazed surface area increases, and the differences become evident (as shown by the line slope) as the location climate becomes more extreme. It is important, anyway, to balance the fenestration reduction due to thermal comfort consideration, and a minimum amount of windows due to the need of natural lighting.

Another strategy consists of placing local window shading devices, like 1m deep overhang and side-fins, which can represent small loggias surrounding the apartments. A final strategy for the top floor apartment is to replace the ceiling board with concrete slab to increase the total thermal mass of the room. The results by applying all these cooling strategies (fenestration, shading and ceiling weight) and their combined effect are illustrated in the Figure 6 below.
Figure 6: Discomfort degree-hours for the flat on the fifth floor of building 01, according to the different free cooling strategies considered.

Considering Mombasa, that experiences the most extreme hot conditions, Figure 7 shows the percentage of yearly hours spread into the different comfort acceptability ranges.

Figure 7: Percentage of the yearly time falling in each comfort range for the flat on the fifth floor of building 01 in Mombasa.

It can be observed that with shading and fenestration strategies, a 10% increase on the time achieving the 90% of acceptability, while the ceiling strategy seems to have no positive effect, compared to the base case. The situation changes if all the acceptability ranges are considered, meaning that only the most uncomfortable condition (“hot”, as described by the ASHRAE thermal sensation scale) are considered as actual discomfort: in this case, both the shading and the fenestration strategies achieve more than the 60% of the yearly time in comfortable conditions.
5. Conclusion

The main issues arising from this simulation is the huge performance difference of the decanting site buildings in different location: in Nairobi the observed performance is generally good even without applying cooling strategies. If the same construction plans were to be used in Kisumu and Mombasa, the performance of these buildings would be compromised, with a high probability of future cooling device installation. It is therefore important to consider the climatic peculiarity of the construction area and the building location during the design phase. In Kisumu, for example, the considered strategies combination may reduce the discomfort degree-hours with more than the 60%, showing how design solution can easily deter the occurrence of poor thermal performance in buildings.

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Environments of Change: A Design Solution for an Informal Settlement in Mamelodi

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Abstract

It is not necessary to emphasise the poor living conditions and lack of basic services within informal settlements. Informal settlements are unstable by nature. Even within relatively stable settlement boundaries, change in fabric continually manifests through altering dwelling configurations. Deemed unstable by formal criteria, these environments disclose schizophrenic characteristics, yet beyond the condemnation exists functional societies capable of survival and self-regulation. Public and private sector investment within informal settlements is restricted as a result of the illegal status, for the same reason inhabitants of these settlements have no incentive to invest their own resources where they have no formal tenure over the land. The inhabitants of these environments require improved service delivery through immediate solutions. However, the growing epidemic of informal settlements shows little signs of creative resolution – perhaps what is required is a service delivery core, a catalyst, stimulating growth and improved living conditions. This core catalyst may allow for the amelioration of the surrounding environment. The study presents a design for this catalyst as a possible generic solution – with specific application in the context of Mamelodi Township near Pretoria in South Africa. The design makes provision for the informal economic sector. Ultimately the design is not limited to fixed mono-functional facilities but rather offers several platforms allowing for diverse interpretation and use. Construction of these catalysts acts to showcase technologies, materials and methods relevant to context. Communication with users through visual observation and tactile interaction is considered essential. The design possesses the potential to be disassembled and relocated elsewhere, but depending on the needs of a specific setting could also be absorbed within a new expanding urban fabric giving direction to future township development. Public space shaped by the architectural intervention is essential as a socio-economic stimulus inviting private informally-run micro-enterprises to operate within certain parameters: it offers opportunity, enhanced chances for survival and provides a platform for social activity, conversation, exchanging of gossip and a place of gathering.

Keywords: informal settlements, service delivery core, catalyst, Mamelodi, South Africa
1. Introduction

“In developing countries, the term ‘slum’...simply refers to lower-quality or informal housing. Large, visible tracts of squatter or informal housing have become intimately connected with perceptions of poverty, lack of access to basic services and insecurity. Terms such as slum, shanty, squatter settlement, informal housing and low income community are used somewhat interchangeably by agencies and authorities” (UN-Habitat, 2003, p. 9).

There is a growing epidemic of informal settlements, albeit by different names occurring throughout the world with little sign of a cure. Perhaps what is required in this time of searching for a cure is an interim held service delivery core, a catalyst, stimulating growth to improved living conditions.

The negative connotations of informal settlements persist. In order to remove this demeaning overtone it is essential for an architectural design intervention not to be condescending, but rather uplifting and empowering, initiating a change in outsiders’ perception of informal settlements and their inhabitants as well as stimulating self-help strategies of the inhabitants. Thus the proposed design for a specific case study area in South Africa acts as both symbol of hope and progressive change.

2. A need for building systems suitable for environments in constant flux

Informal settlements are flux by nature. Even when settlement boundaries have been met, a change in urban fabric continually manifests through altering dwelling configurations. The disassembly and recycling of structures together with new informal extensions frequently remodels the dwelling units for increased practicality. Existence is treated as temporary by higher authorities while in the reality of the situation existence of both the settlement and its inhabitant is for a delayed period of time. Most often located on the outer periphery of cities and industrial areas, the residents are near enough to serve but not close enough to be served.

The difficulty in defining slums is that “slums change too fast to render any criterion valid for a reasonably long period of time” (UN-Habitat, 2003, p. 11). This gives reason, motivated by the changing settlement patterns within the study area of Mamelodi, Tshwane, South Africa, that an architectural solution for progress may have to be impermanent and possibly relocate once it has served its purpose on site or adopt a new programme capable of merging into a new, upgraded urban fabric.

There is a need for a built system that is capable of learning and evolving in time; the capacity for change is integrated within the design system. It is necessary to design for future scenarios by “devising an ‘adaptive’ strategy that is exceptionally alert to changing events and can adjust quickly” (Brand 1995, p. 183). The Mechano like steel structure of the design intervention is thus adaptable and flexible throughout its life in order to best respond to ever-changing conditions. The built
configuration encompasses both concepts of adaptability: “capable of different social uses” (Groak 1992, p.15) and flexibility: “capable of different physical changes” (Groak 1992, p.15).

3. The South African informal settlement

Informality exists on the peripheries of South African cities. These cities, despite political change since Apartheid still maintain the patterns of segregation imposed by the previous eras. This pattern has led to numerous social and political problems and has led to violence, crime, service delivery protests and xenophobia. Thus the problems faced by these areas need to be urgently addressed if political stability is to be achieved.

Deemed unstable by formal criteria, these informal environments disclose schizophrenic characteristics: below the smog of condemnation lies a functional pragmatic society capable of self-regulation and self-order, responding to the very use of the user. There is a deeper intrinsic understanding within an informal setting. “Planning” of informal settlements within South Africa is gradual and is determined by the intensity of use and forces (the user and environment). Street grids are established, organic by nature and true to the energy which shaped them, the grid is often more suited to a pedestrian scale as it is determined by the main mode of transport within the settlement, the foot.

The way of constructing the ubiquitous ‘tin’ shack reminiscent of many informal settlements throughout the world is inadequate yet affordable. A rain-screening shelter no doubt, the nailed timber structure with the usual steel sheet clad exterior offers the user only the bare essentials to shelter.

Through investigation it was found that the inhabitants of informal settlements throughout Tshwane, South Africa, are resourceful and innovative. There exists a certain order within the apparent chaos of informality. Internal policing, construction and trading are all resolved and carried out on a scale suited to its environment. Informal settlements establish roots: cultural, social and individual while the occupants conceive of methods for survival with only a limited degree of permanence (stability), which in turn supports the greater structure of the settlement and the community.

4. The informal sector in Mamelodi, Tshwane

Mamelodi is an expanding area capable of absorbing older informal settlements within its new fabric, yet at the same rate giving rise to new informal offspring. These settlements offer limited infrastructure and lack the public amenities needed for improved social and health conditions.

Mamelodi is a residential suburb approximately 25km² in area and was originally established in the 1940s as a township for black workers near the train station at Eerste Fabrieken. In time Mamelodi expanded to the East beyond the Pienaars Rivier, locally known as the Moretela River. Informal residents located on the erratic edges would either move into the new formal housing or together with newer immigrants would again relocate to the shifting outskirts of the township. Settlement patterns
have been predominantly to the East. These informal settlements have been continuously uprooted and displaced by the expanding formal urban fabric of the township. The informal settlements in the extreme East and South-East of Mamelodi (informally known as Lusaka and Phumolong) were identified as areas in urgent need of basic services with high fire risks and poor sanitary conditions.

Mamelodi is divided into two sectors by the Pienars Rivier, Mamelodi West and Mamelodi East. Mamelodi West shares a distinct border with the established township of Eersterust to the West and the industrialised area of Silverton to the South-West. The Magaliesberg mountain range defines the northern perimeter of the greater Mamelodi. Mamelodi East is bound by the North-South lying branch of the Magaliesberg mountains and new commercial and residential development to the South in the Willows. Mamelodi East contains a great deal of informal dwellings, particularly in the extreme East where there is significantly less formal housing and limited infrastructure.

Mamelodi shows traces of its numerous growth patterns, both from its pre-apartheid and post-apartheid era’s. It displays evidence of the diverse urban planning typologies practised during the changing years of government and the fusion of incongruent road grids baring testimony to the many contrasting forms of housing typologies implemented within the township. There is also much unconstrained growth in the form of informal housing shacks depicted by the smaller informal grid patterns.

The informal sector of Mamelodi located to its east predominantly consist of wards 10, 16 and 17 respectively. Collectively these wards comprise more than one third of the area of Mamelodi served by 1 clinic in ward 17. Sanitation is of a concern in these areas with poor health circumstances as result. Much of the material used to construct the inferior shacks is obtained from the surrounding industries, much of it from the Ford manufacturing plant in Silverton.

Much of the current formalised township of Mamelodi East is composed of consolidated informal settlements, in which land previously subdivided without approval is usually sold or leased to the informal residents and has overtime been recognised as part of the township. Improved infrastructural networks are provided and these informal settlements are merged within the recognised township. In contrast, squatters have been relocated and the land been developed for new Reconstruction Development and Plan (RDP) houses subsidised by the government. Current South African Government aims to provide formalised housing and services to these informal communities, however priority is given to the informal settlements “of the most vulnerable and disadvantaged groups” (UN-Habitat 2003, p.129) and those established during the apartheid regime and pre-1994 (Metroplan, 2006), thus excluding the specific site under investigation due to its recent establishment, post 2003.

These informal dwellings encroach upon the Magaliesberg on the eastern front. The threat of shack fires exists due to the high combustion rate of the building material used together with the internal contents and the high densities of informal dwellings within small proximities to one another.
5. The site: Phumolong informal settlement

Phumolong is located in ward 16, extension 6, Mamelodi, Tshwane, South Africa at coordinates 25° 44'00" S 28° 25'00" E. It is almost completely surrounded by the township of Mamelodi (figure 1) except to its south where the municipal boundaries of the City of Tshwane and Metsweding meet (both situated in the province of Gauteng).

Figure 1: Location of Phumolong informal settlement within Mamelodi and distances from critical services.

‘Phumolong’, Sotho for ‘resting place’ is the local name for the piece of land occupied entirely by informal settlers and shacks with almost no municipal services provided. The area of Phumolong is located along the curved main road of Hans Strijdom (M10) defining both its Northern and Western boundary while two converging railway tracks demarcate its Eastern and Southern limits (figure 1). This area is locally referred to as ‘bridge to bridge’ and is managed by a community elected ward leader and committee. The older neighbouring community to the North-West, known as Marabastad by the locals, also belongs to Mamelodi extension 6 and boasts RDP housing together with the necessary infrastructure. The few services found in Phumolong are circulated from its neighbours by means of illegal ‘izinyoga’ (sotho for ‘snake’) connections. Hose pipes are connected to garden taps within the neighbouring Marabastad and transverse the last dividing asphalt roads unseen and largely
overlooked by the municipality before entering Phumolong where the hose pipes meander down the gravel roads serving the community of Phumolong. The minor amount of electrical connections found on the outskirts closest to Marabastad occurs likewise.

Through further investigation of the Mamelodi context and mapping of public services, it was identified that Mamelodi had no fire station yet had high amounts of fires, the highest among any other wards in Tshwane for the year’s 2007 and 2008 (City of Tshwane Disaster Management Services 2008). A fire station was deemed necessary by both the authors and the Chief Fire Warden of the Pretoria Central Fire Station (J Pieterse 2009, 25 May). A central location would offer greatest access to fires within Mamelodi and the neighbouring areas of Nellmapius, Eersterust, Waltloo and the area of the Willows.

Inadequate vehicular access and the absence of fire hydrants within Mamelodi and its informal sectors delay the process of extinguishing fires. This gives fires time to spread, many times having deadly consequences. The provision of a water reservoir, sorely needed by the informal residents for human consumption, could also co-function as a ‘fire filling station’, operating as fire hydrant in times of fire. This idea gave rise to the concept of a servant core with its primary activities based around the provision of water (figure 2).

Figure 2: Services to be accommodated during first phase of catalyst
Location is suggested along the edge of a well-used football pitch (figure 3). This allows for easy access to water in times of fire and also guarantees a constant presence of people and will hopefully create a sense of pride and ownership in the structure.

Figure 3: View of the informal settlement showing the football pitch along which the intervention is proposed.

6. The project brief

The project aims to develop a design intervention improving service delivery as well as social well-being within the informal settlement of Phumolong. The design scheme acts as catalyst for social growth as well as system and services growth; responding to both the individuals and the community needs.

Design is to be the generator that promotes an ordering structure within the urban fabric, acting as common thread binding both fabric and the societal life. The design aims to realise improved infrastructure and services, improved social relations and general well being of individuals, a sense of community pride and participation as well as giving emphasis to the importance of positive public space.

Through this process lack of public amenities and services is addressed. Also, in the process, architecture is investigated as a responsive system composed of participatory parts, as a changing relationship of form and programme and as having the potential to achieve a higher degree of independency from off-site energy systems through the integrated design of energy inclusive systems and infrastructure. In other words infrastructure as architecture is explored resulting in an adaptable and flexible architectural plug-in system.

The design intervention also serves as a symbol of renewed hope and support. It establishes an improved identity within the settlements and informal sector. The service core provides place and opportunity for the local business owners and surrounding residents and is capable of expanding according to future needs, allowing new and changing programmes to be attached to the system. The intervention is a public services building integrating public space with public services and amenities. The users are the informal occupants, business owners and the community as a whole. The phased growth of the design intervention (figure 4 and 8) incorporates various clients at different stages. The
first client[s] will be responsible for construction of the primary structure and necessary infrastructure and will most probably be the Government and its relevant departments such as; the Department of Human Settlements, Department of Energy and the Department of Rural Development and Land Reform.

The secondary clients are responsible for construction of buildings having civic importance and serving as public amenities. Such programmes and clients may change depending on need of the community but may typically be healthcare, educational facilities or even a post office or place of worship. The lifespan of such programmes depends on the needs and position of the community at a given time. Other clients such as small, medium and micro-enterprises will be responsible for their own building construction and attachment to the servant spine. They too influence the growth of the servant spine. Advertisements and branding attached to the building structure may generate further capital needed for maintenance and systems growth.

Figure 4: Phased growth of service core to servant spine

Possible funding and material can also be obtained from sponsors such as steel manufacturer Arcelor Mittal. This company has partnered with the South African Department of Education to build ten schools throughout the country using new steel technology. “Mamelodi Primary School, in Tshwane, is scheduled for completion at the end of the year and is built using insulated panels technology, which relies on steel as a building material with the argument that it can withstand extreme weather conditions, is fire resistant and quicker to erect than when using conventional building technologies” (Shirley 2009).

7. The suggested construction method

It is important to note that the proposed structural configuration is not a “one size fits all” but rather an assembly of easily attained, transported, manipulated and fastened parts. Future construction methodologies with changing appropriate technologies may be attached and fixed to the structure, thus it is not limited to a specific kit of parts but is rather a structural configuration undergoing constant evolution according to best practice at a particular moment in time.
The common construction method in the townships is that of the block/brickwork house and the shacks. The former, constructed through government subsidies, uses wet works construction and typically contributes to the establishment of more permanent settlements. It is also widely used for additions and alterations in the more established wards of Mamelodi by land owners. The latter is usually comprised of a timber framed structure and clad with steel sheeting; it provides no more than the essentials to housing. Construction is quick to assemble and widely practiced by the informal community. Its counterpart, the ‘Zozo Hut’, is constructed in like fashion and has established itself amongst the informal business enterprises. It is also commonly erected on formal stands and is used as a rentable outbuilding. It is often seen as a temporary solution to housing due to its ability to be relocated with the user.

For this project, these two systems are taken into consideration with regards to achieving a degree of permanence and changeability. Thus the criteria for material and construction demands ease of transport, on-site assembly using local labour, self-informing assembly by unskilled labour, labour-intensive operation, piece assembly and erection, skills transfer, low skills operation, economic viability, little or no heavy machinery to be used, limited need for electricity (thus requiring the majority of work to be done by manual labour with no welding). This has led to the consideration of a steel structure fixed with nuts and bolts (figures 5 and 6), assembled on site with the ability to reuse the components upon disassembly, relocation or manipulation of the structure.

Figures 5 and 6: Flexible steel structure composed of modular parts

Lightweight cold-formed steel sections are ideal as a building material. The advantages are that this form of structure is lightweight, has a high strength-to-weight ratio, high stiffness and comes in various shapes and sections which can allow for additions and alterations with minimal wastage. The material allows for compact packaging (and transport) and can be mass-produced. “Accurate detailing can be achieved and the result is not prone to shrinking and creeping and thus achieves a uniform quality and is non-combustable” (Wei-Wen Yu, 1985, p.2).

Hydraform dry-stacking blocks have the following dimensions 120-240mm long x 220 or 140mm wide x 115mm high with typical strength values of 4-7MPa. This method is considered as infill in this project as these blocks are ideal for remote regions as they are produced on-site by means of a mobile
or stationary block-making machine. The interlocking dry-stacking blocks require minimal mortar and are produced from Laterite (building sand/sub soil) and 5-10% cement. Hydraform uses soil cement Compressed Earth Block (CEB) technology. Blocks do not need to be burnt and need a minimum of 7 days curing. Hydraform equipment is made locally and the franchise provides full training and support. Mobile block making machines need low-skilled operation with little or no dependence on higher skills. Thus it is labour intensive with almost all of the production and construction process occurring on-site. It is thus cost-effective and fast to use.

Finnbuilder box shuttering dimensions are 480 mm (length) x 220, 150 or 110 mm (wall thickness) x 240 mm high and allow for straight as well as circular walls. Finnbuilder is a slip form shuttering system whereby a shuttering mechanism is filled with the necessary cement, sand and aggregate mix and upon compaction is slid to the next area along the length or height of the wall/column. The main advantages are that it is produced on site, is labour-intensive, on-site soil may be used, low skills necessary, skills transfer and is thus a low cost-high strength option.

Brownbuilt is used as roofing or cladding material. The interlocking profile together with its clip-fixing require no fixing holes for screws or nails, thus eliminating the damage incurred to the sheeting by such holes and allowing it to be reused. Produced in widths of 406 mm the lengths are specified by client and only limited by transport (usually 18.6 m). The sheeting can be used in conjunction with other sheeting profiles by using the relevant flashings and is easy to construct.

Abeco hot-dipped galvanised lightweight pressed steel tanks are composed of prefabricated modular panels. These panels are used to erect tanks for water storage and are ideal for remote areas where access is limited and their small modular size and robustness allow for easy access and undemanding transport. Panel sizes are 1220 mm x 1220 mm or 610 mm x 1220 mm half panels produced in 3 mm, 4.5 mm and 6 mm thicknesses. Max depth restricted to 4 panels (4880 mm). Panels can be painted on by various children and artists belonging to the community helping establish community pride, deter vandalism as well as aid in corrosion resistance.

Only 3 types of fasteners, all 8 mm in diameter, are to be used on the steel structure reducing the need for a variety of fasteners and chances of error. These are hot-dipped galvanised, high tensile grade nuts and bolts, guard-nut tamper-proof fastening system (in accessible areas to prevent vandalism and theft), and galvanised gutter bolts.

Using these materials and technologies as the basis for the building parts, an adaptive system emerges, a system capable of reacting, growing, shrinking and learning. The steel structure undergoes a structural and programmatic evolution (figure 7), reacting to need and growth intensity. This prevents an initial high capital cost as well as allowing the layout to be tested by the users and then respond appropriately.
Figure 7: Evolution of modular steel structure

Figure 8: Phased growth of building system
8. Conclusion

For this proposed system to be successful, the community of Phumolong needs to be fully involved from the outset. A strategic site is crucial in establishing the service core as a catalyst, which will trigger off more activity and construction, either attached to the service core or in close proximity to it. The design intervention is limited by the willingness of clients to invest into such a project. However, as discussed above, the initial intervention need not be an immediate, large, capital-intensive intervention, but rather an ongoing process. Ultimately the aim of the servant core is to serve the community by providing the necessary services while acting as generator for social upliftment. In conclusion, the architectural approach encourages the design intervention to be treated as a process of progressive change.

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J Pieterse 2009, personal conversation, 25 May


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