

# The Role of Flexibility and Adaptability in Achieving Functional Efficiency in the Informal Housing Context in Egypt

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## Abstract:

Egypt, as one of developing countries in the world has a massive population growth and a deficit in the housing supply for the low income people. The recent public Housing programs in Egypt have a design tendency of the production of a prototypical and a preconceived housing blocks that were built according to minimum space requirements to minimize the costs. The planning system of the public housing has a "top-down" approach with the imposition of conventional housing schemes resulted in the dissatisfaction of the housing units. The informal housing sector has a great contribution in the housing provision and with its relatively affordable housing blocks attracted most of the middle-income people to build their homes. Flexibility is a prominent consideration in the design of housing to be socially, economically and environmentally viable. The research investigates flexibility aspects in the built-up homes in the informal housing context in Egypt. Flexible housing responds to inhabitants' needs throughout time. In other words, it evolves from the change in residents' requirements and needs over time. The aim of this research is to review different methods and techniques to achieve flexibility and the potential of creating functional efficacy in the housing spaces. To achieve this goal, the research reviews the terminologies of flexibility, adaptability and the related concepts, it also review the prominent international case studies in flexibility in the twentieth century to discover the different methods and techniques of the architects.

*Keywords* —flexibility, functional efficiency, Informal housing, Low-income people.

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## I. INTRODUCTION

The urban population in the developing world will double by the year 2030, which means that we have less than 20 years to build as much urban housing as was built in the past 6,000 years (Goethert, 2010). During the World Urban Forum 6 of Naples, Italy, the UN-Habitat announced that the organization is in the process of setting up a "Global Housing Strategy to the Year 2025" (GHS2025). According to the first information sheet circulated by the UN-Habitat, the GHS2025 will advance the Habitat Agenda theme of

"adequate shelter for all" and prepare a new vision of housing through a global strategy document emerging from broad-based national, regional and global consultation processes. The inadequate public policies resulted in the lack of adequate and affordable housing, which in turn resulted in over 860 million people around the world living in slums and informal housing (UN-Habitat, 2012). Providing an adequate and affordable shelter for all is a global problem that needs to be addressed and discussed according to the lessons learned from the experiences of the different approaches that are applied all over the world. This paper discusses the

recent Egyptian experience in encouraging the participation of low-income groups in the construction process of their own houses through an incremental housing program. The paper also derives the implications that could be learned from this experience towards better application in the future.

## II. HOUSING PROBLEM IN EGYPT

The provision of affordable housing units is one of the major problems that has been facing all sequential Egyptian governments since the mid of the twentieth century. This long period of dealing with this problem resulted in a huge deficit in the housing units needed for low-income groups. This deficit is estimated at about 3.5 million housing units (Rageh, 2007). This deficit is primarily caused by a steadily growing gap between demand and supply of housing units for lower income groups. The problem is further escalated by rapidly deteriorating housing stock, high rates of population growth, informal housing and slums expansion, regional imbalance, urbanization explosion, low productivity, deficient housing and construction industry, inappropriate formal housing policies and inadequate housing and development legislations (Abdel-Kader and Ettouney, 2012).

In general, the provision of affordable housing in Egypt is characterized by several negative features that resulted in expanding the housing problem in Egypt rather than solving it. These negative features include (Ettouney, 1987; Ettouney and Abdel-Kader, 1989; Rageh, 2007; Sims, 2012):

- The "Top-down decision making policy excluded the targeted groups from the design and planning processes.
- The mismatch between the prices of the completed affordable housing units and the abilities of the targeted groups, which resulted in an expanding affordability gap.
- Exaggerated adopted building and sites standards of the recent completed formal affordable housing projects.

## III. GOVERNMENT PUBLIC HOUSING PRACTICES IN EGYPT (HISTORICAL OVERVIEW):

Since the mid Nineteen Seventies, the Egyptian government adopted and implemented a variety of low-cost housing development strategies including: site and services schemes, core housing projects, partially completed housing units in apartment blocks, and totally finished housing projects (Ettouney and Abdl-Kader, 2011). In most cases and for political reasons, the Egyptian government favoured the strategy of the totally completed housing projects as these projects clearly reflect the efforts of the government in solving the housing problem.

The main government adopted public housing experiences for people on low income in Cairo can be subsumed into three distinctive stages. In the first stage, from the early 1950s to the late 1970s, many low-income housing projects were built within the urban agglomeration of Cairo. The second stage, which started in the early 1980s, a large number of low-income housing apartment units were built in the desert in the new urban communities around Cairo. The third stage, which started from the mid-1990s to the present, resembles the second stage in some aspects but radically differs from it in terms of the urban and architectural forms of the housing product

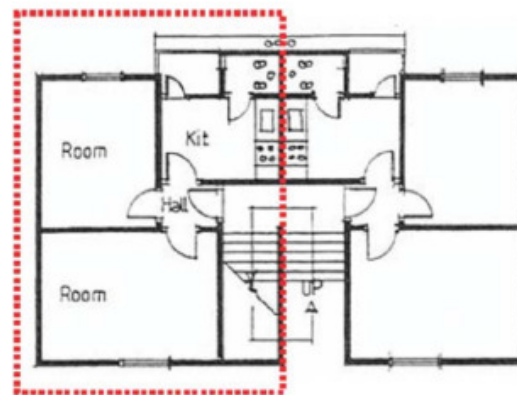


Figure.1 a typical two-roomed housing unit in a typical low- income housing project in cairo. Source: tippel (1991, p. 36).

**A. SHORTCOMINGS OF THE PUBLIC HOUSING SCHEMES:**

The standardized and prototypical housing schemes of the public housing was built with limited habitable spaces with the tightness and lack of space inside the dwelling, the neighbourhood layout usually has wide public open spaces between the blocks (Figure 1). Furthermore, the social and physical services, essential for these housing projects, were inadequate. Thus, the government, with its housing agencies and professionals, had provided what can be considered as mere shelters for the low-income target groups.

This "Top-down" decision making policy and the "long-term view" resulted in Socio-cultural dissatisfaction originated from, first, the lack of responsiveness and adaptability of housing units where the different housing habits of the occupants were obviously ignored. Second was the high overcrowding rate inside the housing units. Third was the low range of outdoor social activities, as most of the open spaces between the blocks of low-income public housing projects were neglected.



Figure.2 Lack of outdoor services in the public housing projects.  
Source: Author.

**B. EXPANSION OF INFORMAL HOUSING IN EGYPT :**

Housing demand was still growing because of the Increasing population growth and the migration movements from rural areas to the city. The middle and lower classes found the informal sector an adequate alternative to fulfil their needs. The informal housing settlements have been expanded due to the increasing migration rates and the strict

legislations from the government. (Khalifa, 2011) Thus, informal settlements were the only available solution for the poor (Hassan, 2012) and it led to the change in the social conditions because of residential migrations. These Chaotic and informal settlements attracted most of the low-income and middle class citizens in affordable living cost and in a few years these informal settlements have been expanded due to the increasing housing demand.

It could be inferred that Informal housing is

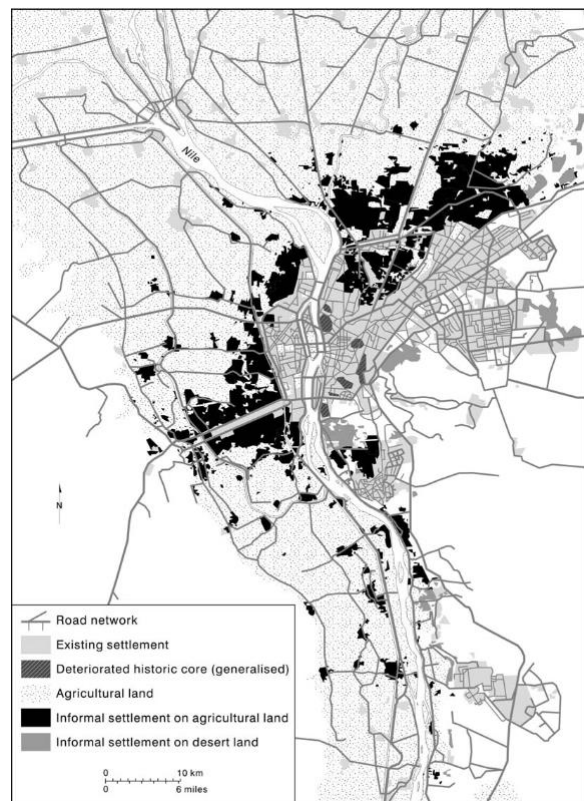


Figure 3 A map of the informal settlements in greater Cairo region.  
Source (Sims, 2003, PP. 5).

closely connected with the absence of a fiscal policy which would have secured revenues for the construction of public facilities. The absence of a balance in the investment mix between private and public residential development is at the root of the present conditions in informal housing, of which four important aspects are worth emphasising. First, a valuable effort has been made by individuals to build dwellings of reasonable quality. Second, the

absence of planning (owing in large part to the inability of the public sector to finance the equipment of residential subdivisions) makes these areas unserviceable in the future (no street rights of way) should public resources become available. Third, speculators use these circumstances, through illegal subdivisions of private land, to minimize the construction cost and making a profit.

**C. FLEXIBILITY AND ADAPTABILITY EVIDENCES IN THE INFORMAL HOUSING CONTEXT**

On the other hand, Statistical data shows that the Informal sector in Egypt has a substantial contribution in the housing provision for the low-income people. The informal settlements has satisfied the needs and aspirations of the low-income residents and adapted to their changing needs in time. The design of this informal settlements reflect the original needs and lifestyles of its residents, the typology of informal housing has a potential for change and adaptation over time and could be transformed with minimal cost to meet the changing needs of users. The success of a designed environment depends substantially on its ability to satisfy and support particular functional and spiritual human needs, especially socio-cultural ones and it is usually the user and the community who pay the psychic and social consequences of ill-fitting environments (Sanoff, 1990). In that respect, the importance of flexibility and adaptability in the housing context is briefly discussed.

**D. FLEXIBILITY, ADAPTABILITY AND TYPOLOGICAL VARIETY:**

Flexibility refers to the accommodation of changing needs and aspirations between events, contexts, and the use of space. The most common meaning of it is flexibility by technical means, which, as (Forty, 2000) states, can be understood in relation to a couple of types. The first one is flexibility by movement or the reconfiguration of the dwelling's intricate elements. The second type of technical flexibility refers to the use of lightweight demountable fixtures and fittings, and

movable floors, walls and ceiling panels, including open-plan design.

The concept of flexibility in the context of architectural housing is introduced under two topics: "the evolving conditions of the vernacular" and the "external pressures that have prompted housing designers and providers to develop alternative design solutions, including flexible housing" (Schneider & Till, 2007). According to this, it can be claimed that flexibility in domestic architecture either evolves and improves from the experience of traditional tendencies in housing design or appears as a new design tendency which follows the outward forces of the twentieth century (Albostan, 2009).

In fact, flexibility as a solution, in today's social housing, is an issue that has been considered on different levels throughout time in eastern architecture. In Japanese traditional architecture, sliding doors have the finality of separating spaces as well as changing the dimensions of these in the house. As a result, multi-functional spaces are created by opening them up.

The openness of the plan as well as the frame construction suggest that functional and social

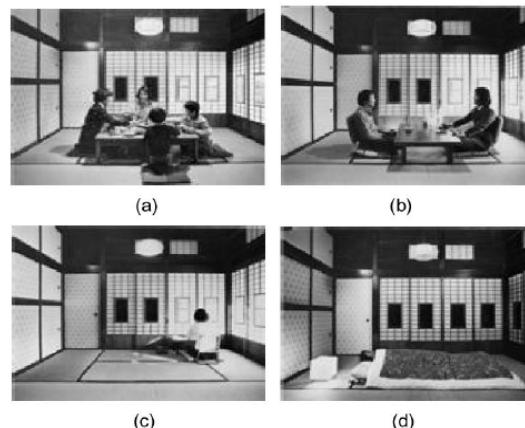


Figure 4 different uses of the space in a traditional Japanese house. Day and night uses of the space. Source (iasef md, 2011)

changes can be dealt with easily - both on a daily basis as well as on a periodic or even longer term. At a basic level the case of flexible housing is a straightforward matter of sustainable environments.

Despite the fact that a dwelling should be dynamic, it is too often framed intellectually and physically as something fixed. In fact, one of the problems of treating housing as if it were a static product with fixed design parameters is that it reaches a world of changing needs. A mix of units that meet immediate demand might well be inappropriate in thirty, let alone one hundred, years' time. Thus, over the past twenty years there has been a decrease in the number of traditional family units, a higher proportion of elderly people, and an increase in the number of single-person households.

Architects now pay considerable attention to the users of residential units whose creative motivations have an influence on their homes. According to past experiences which have seldom been recognized, the inhabitants of a dwelling, including the owner or the family group who resides there, shape their homes. Sometimes they design and build them by themselves. Informal housing households always modify and shape their dwellings by rebuilding, furnishing, landscaping or simply by dwelling within the forms and spaces of domestic architecture. Therefore, the places where people inhabit are comprehended as a space in which to illustrate the ideas of family, individuality, lifestyle, privacy and socio-cultural patterns

#### **IV. RESEARCH METHODOLOGY**

The research uses a conceptual framework to assess flexibility in the selected case studies through four main themes 1) "the structural system", 2) "the service spaces", ("access units", and residential "wet spaces"), 3) "the architectural layout" ("variety of types" and "the spatial organization" of units) and 4) "furnishing for flexible use". They are explored in the light of the "soft" and "hard" analogy.

#### **V. THE INVESTIGATION OF THE CASE STUDIES:**

The design of the permanent components of the building determines the degree of flexibility in the housing context through the design of the structural system, is important in determining whether the

architectural layout will be flexible or not. There are two main structural methods to attain flexibility: "base structures" and "polyvalent organizations". The former refers to a structural system that allows a layout that is not fixed in functional sense, however vague and left as generic space. It is mostly composed of columns and beams. The latter one, "polyvalent organization", is based on designing vague rooms or cells that are appropriate for any function (Schneider & Till, Flexible Housing, 2007)

The position of the service spaces and service cores can be regarded as a determinant for the configuration of the main spaces. Service units can be a part of the structural system, or they are designed separately. They comprise "access units" in the scale of both building and unit, and the infrastructure that determine the location of "wet spaces". Schneider and Till emphasize the importance of the position of service spaces in the design of housing:

- 1) The strategic placing of service cores to allow kitchen and bathrooms to be placed within specific zones but not to be permanently fixed.
- 2) The ability to access services so that they can be updated at a later date.
- 3) The distribution of services across the floor plan so that they can be accessed for in any plan arrangement. (Till & Schneider, 2005, p. 294)

In the selected case studies the service spaces have been collected in specific zones so that the main space can be undisturbed as generic space, "freedom in internal layout". The service spaces can be placed on areas of the facades or in the middle of the building.

On the other hand, the investigation on the architectural layout of the selected case studies focuses on two scales: building scale and unit scale. Firstly, in building scale, the alternative configurations of different "types of units" on each floor are investigated. Units are composed of permanent components such as service spaces, wet spaces (kitchen and bathrooms) and structural

Structure system and services distribution	Floor plan organization
<ul style="list-style-type: none"> <li>• Main structural system Base structure system consists of columns and beam system</li> </ul>	
<ul style="list-style-type: none"> <li>• Main Indeterminate Space The floor plan gives a free open space that could be used for diverse functions</li> </ul>	
<ul style="list-style-type: none"> <li>• Access system in the building The building has a central core to access the units.</li> </ul>	
<ul style="list-style-type: none"> <li>• Wet spaces (vertical shafts) The distribution of wet spaces in the floor plan gives opportunity for future change.</li> </ul>	

Figure.5 analysis of the structural system and the position of service spaces of the building. The author

elements, and besides, the main space is composed of living spaces and rooms. Secondly, in unit scale, "the spatial organization" of different functions in units is explored. The aim is to discuss the limitations and possibilities of the permanent components on the design of architectural layout.

It could be noted that the structure system and the position of services along vertical service shafts provides indeterminate free open space with appropriate spans for multiuse. The building provides a potential for choice with different types of units which is related to the two stages of flexible use: "initial" and "permanent" flexibility. The first one is achieved at the start of occupancy, the residential block should offer a variety of "choices" to users and second, during the post occupancy period, the housing units should allow users to make "changes" according to their wishes and demands. The building has been extended vertically for the increasing house holds. The "Incremental

building" process in the informal housing provides a potential for future adaptation and flexibility in housing decisions. Furnishing for flexible use, in other words, can be achieved by using furniture as a surface or as a functional unit. The use of movable/foldable furniture, such as a kitchen or a bed utility. This type of furniture is rarely used in the informal housing context because of the relatively much higher costs and maintenance.

## VI. CONCLUSIONS:

It could be concluded that one of the major problems of the conventional housing projects is their limitations to allow changes or adaptations over time, or in other words, their inappropriateness for future scenarios.

The selected projects have been discussed, firstly, in terms of the methods and strategies used to achieve flexibility, secondly, in terms of flexible usage related to ever changing needs and wishes of the users. The design of permanent components play a major role in flexibility and improves the functional efficacy. This approach helps achieve adaptability between domestic space and life, and ultimately enhances the quality of life.

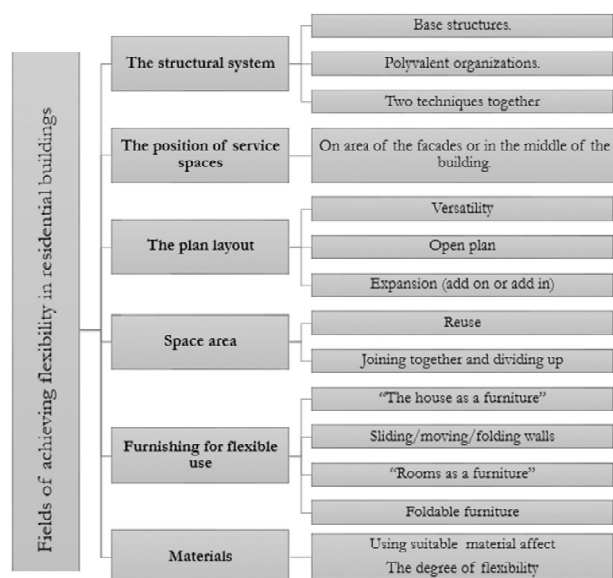


Figure.6 Fields Of Achieving Flexibility In Residential Buildings, By Author

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