

# FLEXIBILITY CONCEPT IN DESIGN AND CONSTRUCTION FOR DOMESTIC TRANSFORMATION

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## ABSTRACT

The flexibility is an important concept in the design of housing, particularly for the economical weaker sections and lower income groups of populations, as most of the of people that live in multistorey apartments find difficult to accommodate their families because of the fixed space available in the apartments in mega cities of India. The problem lies in the severe shortage of land at affordable prices to the group for building individual houses and forced to choose the available shelter options not designed suiting to their requirements. During the day time, most of the living space is required for the daily activities but at night this space can be designed for sleeping. Similarly, the furniture which is not used 24 hours, if folded, a lot of space can be created. The research findings reveal that there are gaps in terms of lack of flexibility and multifunctional living spaces, design and construction of modular units for multistorey apartments suiting to the requirements of the people and the flexibility concept has not been attempted for such segments of population in India. This design study has been carried out at undergraduate level of Bachelor of Architecture, for innovation in Architecture and Construction with a view to address the problems. The units in modules have been designed keeping in view the socio-cultural aspects and the requirements of the people. This paper focuses on the advantages of multifunctional flexible living space and the concept of modular planning by using multiple units consisting of moving and folding of partition walls and furniture, transformed into different objects by splitting them for more occupancy.

**Keywords:** Economically weaker sections, Flexibility, Innovation, Multifunctional.

## INTRODUCTION

The concept of flexibility is an important concern in the design of housing. Flexibility refers to the idea of accommodating change over time. Thus, flexible house corresponds to “a house that can adapt to the changing needs of users” (Till and Schneider, 2005, p. 287). The spatial arrangement of individuals and the corresponding potentialities for the interchange of ideas affect the very nature of knowledge creation and dissemination. Fixed arrangements imply boundaries and inhibit spontaneous adaptations to new forms

of knowing and communicating. Flexible arrangements help blur boundaries and accommodate the spontaneous groupings needed to support change and invention.

*Flexible Housing* is an architectural proposal imagined and coordinated at the room, building and urban scales. Its basic building block – manufactured modular construction – is an old tool yet to be utilized in the important efforts of housing communities around the country to economically expand access to the quality living. *Flexible Housing* also includes reasonable assumptions about the future feasibility of innovative details such as wall size interactive media surfaces and mutable partitions. The *Flexible Housing* plan is a call to think of residential building assets as readily alterable systems with components capable of shifting, for example, from kitchen to living to bedroom or from housing to commercial.

Four main themes adopted from the works of Schneider and Till (2005a, 2005b, 2007) to discuss “flexible housing”, both from the perspective of users and in terms of innovative construction and design, are introduced:

- Structural system.
- Service spaces including wet spaces and access units.
- Architectural layout including different configurations of units and spatial organization.
- Furnishing for flexible use.

The aim of this study is to explore the extents and limitations of flexible design approach in India. The main purpose is to find out how flexibility grants the opportunity to the designers to produce creative options that will respond to changing demands of the users during occupancy whether or not these options are exercised by the users.

Within this framework, this study tries to find answers to the questions mentioned below:

- How does the idea of flexibility inform a design approach?
- What does flexibility offer within the context of housing design?
- What are the extents and limitations of flexible design approach in India?
- What is the scope of flexible housing in India?

This paper explores the concept of flexibility in the design of multi-storeyed apartments for the LIG group. The proposed innovative approach to housing design that concerns flexibility, and aim to bring new perspectives to housing design in two ways: by offering typological variety and by offering the possibility to change over time. The design focuses on flexibility, adaptability and typological variety in the context of housing by addressing/ designing the “structural systems”, “service spaces”, “architectural layout”, and “furnishing for flexible use”.

## **THE STATE-OF-THE ART ON FLEXIBILITY**

The flexibility, in the context of housing represents a comprehensive research on cases in the European context beginning from the early twentieth century. Schneider and Till (2007) which define and discuss the term “flexibility”. They introduce “flexible housing” by providing a criticism on the current condition of housing in the UK, which they consider as an outcome of a conventional approach. The study of Schneider and Till shows the social, economic and environmental benefits and usefulness of flexible housing.

According to Rabeneck, Sheppard and Town (1974), flexibility is related to the construction technique and the position of service spaces in housing design, whereas adaptability points to the architectural layout of the housing. Steven Groák (1992) defines flexibility as capability of “different physical arrangements” and adaptability as capability of adjustments and changes for “different social uses”. Moreover, according to Herman Hertzberger (1991), flexibility suggests an open ended solution, which refers to what is called “rhetorical value” of flexibility, defined by Schneider and Till (2005). He introduces a new concept: “polyvalence”. It also has an overlapping meaning with adaptability and flexibility (Habraken N. J., 2008). Gerard Maccreeanor (1998) has a different view about flexibility. He says that flexibility does not imply “an endless change” and asserts that the buildings which are not originally designed for flexibility, can be the most adaptable ones. Adrian Forty (2000), on the other hand, deals with flexibility as an issue that requires long-term thinking in architectural design.

According Schneider and Till (2005a, 2005b, 2007), flexibility as accommodating change in housing, addresses a number of issues related with the current and future needs of the users. Firstly, it offers variety in the architectural layout of the units. Secondly, it includes adjustability and adaptability of housing units over time. And finally, it allows buildings to accommodate new functions. In order to provide flexibility, architects should consider the possible future needs of users during the design process.

According to Schneider and Till (2005), one of the basic principles of designing flexible spaces is to avoid inflexibility. In other words, design of the inflexible parts of a building play a crucial role in achieving flexibility. Structural system and the service spaces are the permanent components. The research focuses on the structure and plan of residential blocks and their use. It also addresses the issue of social sustainability.

There are two controversial methods in flexible housing design, which belong to the “rhetoric of flexibility” (Schneider & Till, 2007): a determinate way of design that refers to movable transformable spaces and an indeterminate way of design that points to endless changes. These two ways indicate a foreground consideration of flexibility in the design process, but as Schneider and Till (2005) asserts “some of the most successful examples of flexibility tend to operate in the background”, which is another way of flexible design.

Both Habraken (2008), and “Schneider and Till (2007)” agree that flexibility and adaptability have overlapping meanings. The meaning of the other related concept, typological variety, is more obvious. It points to freedom of choice. To introduce the technical meanings of these concepts in relation to the context of housing, especially the meanings of adaptability and flexibility, it is crucial to refer researchers who point to their changing senses over time.

In architectural discourse, “flexibility” and “adaptability” have been defined in different ways. Some of these definitions are compiled in Table 1. In this table, definitions by Schneider and Till (2005a, 2005b, 2007) and N. John Habraken (2008), Andrew Rabeneck, David Sheppard and Peter Town (1973, 1974), Herman Hertzberger (1991), Steven Groák (1992), Gerard Maccreeanor (1998) and Adrian Forty (2000) are included.

The definition of the concept of flexibility may be combined defined as the capacity of buildings for physical change and adaptation according to changing circumstances. Flexibility as an inclusive concept covers the related concepts of adaptability and typological variety and it is achieved by designing the structural system and the servicing of a residential block in a way to allow change.

Author	Year	Flexibility	Adaptability
Andrew Rabenek, David Sheppard, Peter Town	1973	“Flexibility” is proposed against “tight-fit functionalism”. The unsuccessful attempts in flexibility are criticized for they may lead to what they call the “fallacy of freedom through control. Flexible housing should be capable of offering “choice” and “personalization”.	Adaptability in the housing context refers to the housing units that can be easily altered as the circumstances changed.
	1974	The concept of Flexibility deals with the “constructional techniques and services distribution.	Adaptability is related to the “planning and layout” of the building including the sizes of the room and the relation between the rooms.
Herman Hertzberger	1991	In flexible design, “there is no single solution that is preferable to all others; Hertzberger comes with another concept called “polyvalence”.	
Steven Groak	1992	Flexibility points to “capability of different physical arrangements”.	Adaptability points to the “capability of different social uses”.
Gerard Maccreeanor	1998	Flexibility is a “design idea [that leads to] the collapse of traditional layout”. “Flexibility does not imply the necessity of endless change and break-down of accepted formula.”	Adaptability is a “different way of viewing flexibility” which refers to “transfunctional[ity] and multifunctional[ity].” Maccreeanor emphasizes that “most adaptable [buildings] were those not originally planned for flexibility.”
Adrian forty	2000	“The incorporation of ‘flexibility’ into the design allowed architects the illusion of projecting their control over the building into the future, beyond the period of their actual responsibility for it.” The confusion in meaning of Flexibility is based on two contradictory roles: “it has served to extend functionalism and so make it viable” and “it has been employed to resist functionalism.”	
Tatjana Schnieder, Jeremy Till	2007	Flexibility in the context of housing is “achieved by altering the physical fabric of building.”	Adaptability in the context of housing is “achieved through designing room or units so that they can be used in variety of ways.”

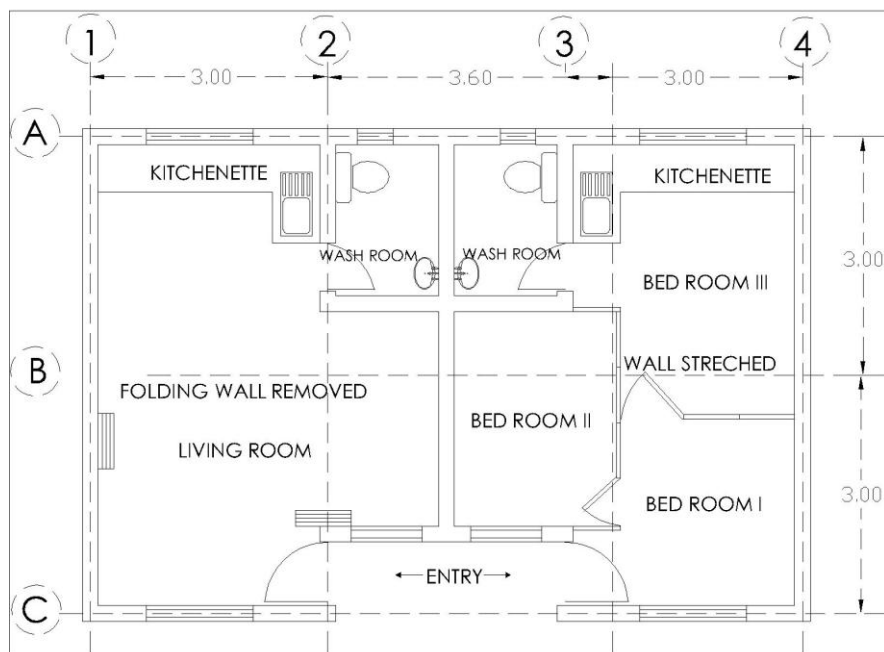
**Table 1:** *Definitions of Flexibility and Adaptability.*

## DESIGN FOR LOW INCOME GROUP

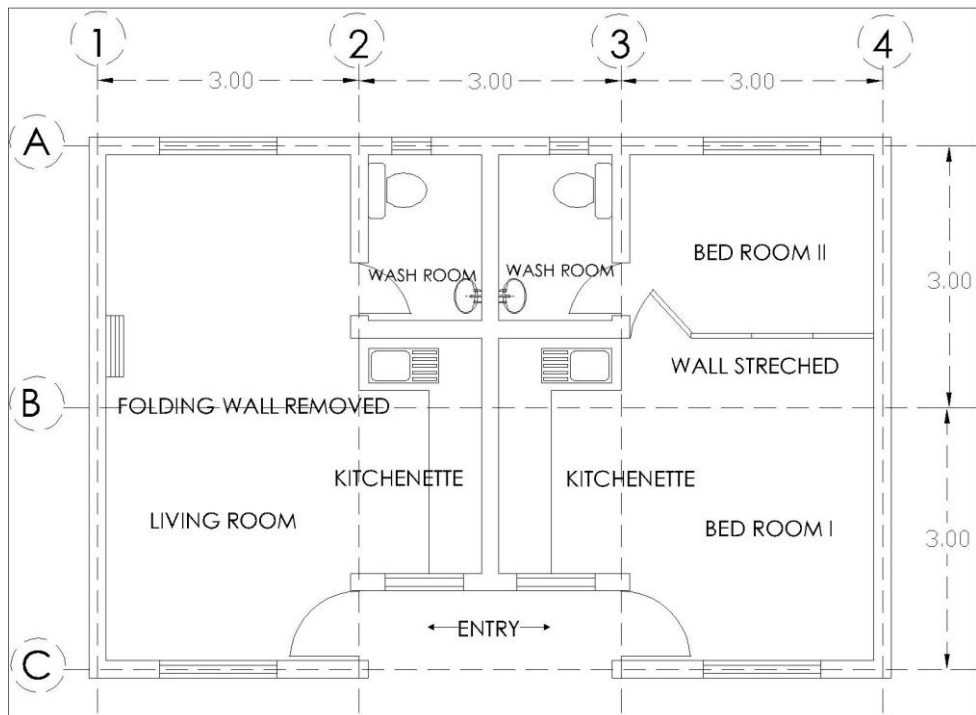
Before designing for the specific category families, small researches were done to study their living pattern as well as socio-economic and cultural requirements of lower income group population. The size of the family is usually four with two adults and two kids. Men of the families usually go out to work but most of the women are house wives, spending their day time with the neighbours helping each other in their daily household works. Also such families do have a small business to fulfil daily needs which they run from their houses only. They do need space for such activities. Any kind of solid furniture hampers their limited space for the work.

### Design approach

This study on designing multipurpose flexible spaces has been done keeping in view the socio-cultural and economical requirements of Lower Income group living in the urban areas/cities of India. The apartments are designed to maximize flexible space for the family members to suit their changing requirements. The area of each individual apartment is 25 sq. m. with a centre line grid size of 3.0 x 3.0 m. considering the concept of modular co-ordination to make the spaces and components standardized to achieve a certain degree of economy. The 1bhk apartments have a flexible moving wall which can be stretched out during night time to separate living room and bedroom (fig. 1). This complete hall has an area of about 18 sq. m. which can be designed as per the needs of the resident. The planning of spaces is done such that during day the whole area can be used as a single space without any partitions in between. The entry to the apartment is through the corridor but is kept introvert for natural surveillance. And windows are provided on both the front and the back of the apartment for proper cross-ventilation. Kitchen is 1.5 x 2.7 m wide, enough for two people to work at a time. The wet spaces of the apartment are kept in the centre of two consecutive apartments, aligned to the rear wall to work out the cost efficiency as only one service core can serve both the apartment. The apartment is proposed as four storeyed (G+3) to avoid the cost of lift. The cluster can be arranged in any form suiting to the site conditions to form a good layout plan.



(i)



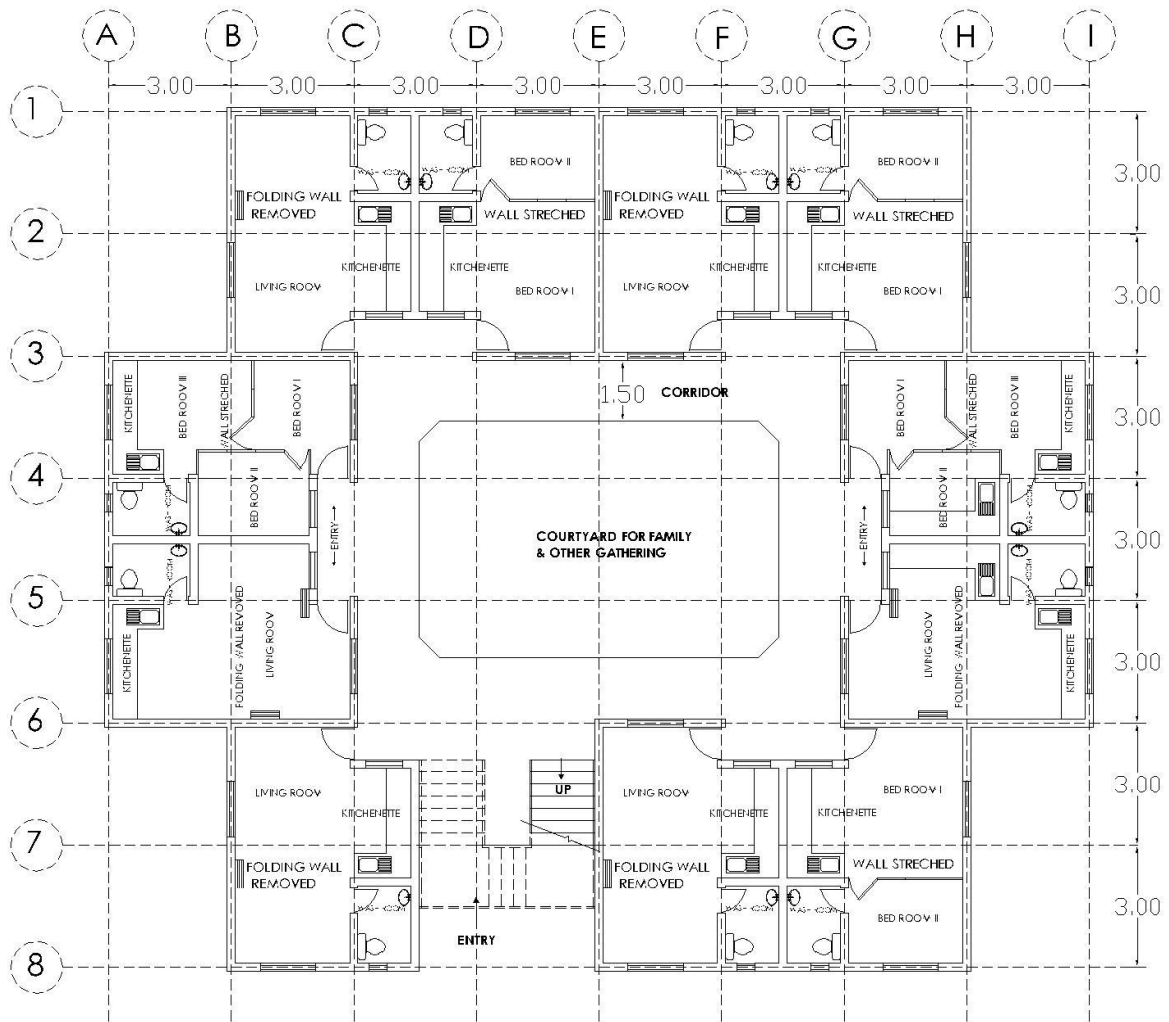
(ii)

**Figure 1: PLAN OF MODULE (i) & (ii).**

The above two figures are the different flexible layouts that are possible for different types of requirements. Fig. 1(i) shows the plan of a layout. In this, the left part shows the flow in the apartment by providing full flexible space for multi- purpose use. Contrary on the right part it shows the use of same space at night time. Fig. 1(ii) show the arrangement of space by which 3 bedrooms can be carved out from the same space when required.

### **Cluster-Courtyard Planning**

The individual dwelling unit has been arranged in the form of a cluster having a courtyard in centre to provide people a comfortable living environment. The courtyard can be used as multi functional open space for the children to play, for parking vehicles as well as for organizing community meetings, particularly during day time by the ladies when the men are at their working places. The module designed has 11 apartments on each floor. A typical floor plan is given below (fig. 2). These apartments are arranged such that a courtyard can be developed within each block. This courtyard is planned to compliment the climatic aspect of India. India have both hot and humid climate. This courtyard helps in proper air circulation and day lighting in each apartment.



**Figure 2 : FLOOR PLAN OF CLUSTER**

### **Furniture**

Furniture for the proposed apartment includes the folding bed, kitchenette and worktops which can be arranged in various ways. A variety of folding furniture is available now a day's which the residents can choose according to their requirements. Some of the common example of this type furniture is given below (fig. 3). Also the furniture which is readily available in market nowadays, designed to serve multiple functions at different times can be used.



**Fig. 3 : Single bed (folding)**

**Double bed (folding)**

## CONCLUSION AND DISCUSSION

The study has been conducted with a view to explore the concept of flexible living spaces and the folding furniture for domestic transformation. This concept although have not been followed in India for the lower segment of the society in urban areas but looking into the affordability of the targeted group of people and the scarcity as well as very high cost of land, the concept of flexibility will help in transforming the group to suit their changing needs and affordability. Although the study has been attempted to work out various flexible spaces suiting to the socio-economic requirements the concept may be tried on a pilot scale to validate the concept with feedback. Similarly, more research is to be carried out further for different income groups by studying their socio-economic and living patterns.

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