

Dedicated To

My beloved family.

Thanks for the never ending love and support.

The Application of Open Building System for Housing Scheme in Malaysia

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ABSTRACT

Immense resources such as land, material, time, labor, money, energy – are being invested in constructing buildings. However, almost all of these buildings, including those currently under construction and on the drawing boards, are not designed with adaptability and flexibility as intention and will cause inflexibility in the future. The lack of functional adaptability for the future re-activation means that their only fate is demolition. Consuming even more resources, producing more waste, and causing more disruption to the environment are considered to be only some tangible consequences of the demolition. However, alteration of mind-set in residential housing design of single storey as well as high-raised towers will pave the way to sustainability. This research studies the level of flexibility in Malaysian house and the impact of inflexibility on the users is studied. Moreover, this research study investigated the probable barriers on the way of developing the Open Building concept and the measures required to be taken for how to overcome these obstacles on the architectural perspective. Finally, the most appropriate partition wall system and the most preferable material which can be used in Malaysia based on the particular climatic condition of this country are studied. It is found that vast majority of the interior layout of the respondents' houses are fixed and suffering from inflexibility which eventually it will enforce the respondents to move away from the house. Moreover, the unavailability of the 'modular walls, fastener and other technical detail', 'Financial Issue' and 'Lack of clients and consultants' awareness towards the Open Building' are recognized by architects as the most important barriers to develop the Open Building System (OBS) in Malaysia. Additionally, sliding partition wall and wood material are chosen by the architects as the most appropriate partition wall system and the most preferable material which can be used in Malaysia based on the particular climatic condition of this country.

Keywords: *“Open Building system”, Spatial Requirement, IBS, Adaptability, Flexible Design*

ABSTRAK

Sebahagian besar bangunan yang sedang dibina , termasuk yang sedang dalam pembinaan dan di papan lukisan , tidak direka dengan keupayaan menyesuaikan diri dan fleksibiliti sebagai niat dan akan menyebabkan tidak fleksibel pada masa hadapan. Kekurangan keupayaan menyesuaikan diri berfungsi untuk pengaktifan semula masa depan bermakna hanya nasib mereka perobohan. Pengambilan lebih sumber , menghasilkan lebih banyak sisa , dan menyebabkan gangguan lebih kepada alam sekitar dianggap sebagai hanya beberapa kesan ketara perobohan itu. Walau bagaimanapun , perubahan fikiran yang ditetapkan dalam reka bentuk rumah kediaman satu tingkat serta menara tinggi yang diperolehi akan membuka jalan kepada kemampunan. Kajian ini mengkaji tahap fleksibiliti dalam rumah Malaysia dan kesan yang tidak fleksibel pada pengguna dikaji. Selain itu, kajian penyelidikan ini disiasat halangan kemungkinan di jalan membangunkan konsep Bangunan Terbuka dan langkah-langkah yang perlu diambil untuk bagaimana untuk mengatasi halangan-halangan ini kepada perspektif seni bina. Ia didapati bahawa majoriti susun atur dalaman rumah responden adalah tetap dan mengalami tidak fleksibel yang akhirnya ia akan menguatkuasakan responden untuk bergerak jauh dari rumah. Lebih-lebih lagi , tidak adanya ' dinding modular, pengikat dan butiran teknikal yang lain ' , ' Isu Kewangan' dan ' Kekurangan pelanggan dan perunding ' kesedaran terhadap Bangunan Terbuka ' diiktiraf oleh arkitek sebagai halangan yang paling penting untuk membangunkan Sistem Pembinaan Terbuka (OBS) di Malaysia. Selain itu , gelongsor partition dinding dan bahan kayu dipilih oleh arkitek sebagai sistem partition dinding yang paling sesuai dan bahan yang paling lebih baik yang boleh digunakan di Malaysia berdasarkan kepada keadaan iklim tertentu di negara ini.

Keywords: "Sistem Pembinaan Terbuka " , Keperluan Spatial , IBS , Penyesuaian , Rekabentuk Fleksibel

TABLE OF CONTENTS

CHAPTER	TITLE	PAGE
	DECLARATION	i
	DECLARATION OF ORIGINALITY and EXCLUSIVENESS	ii
	DEDICATION	iii
	ACKNOWLEDGEMENT	iv
	ABSTRACT	v
	ABSTRAK	vi
	TABLE OF CONTENTS	vii
	LIST OF TABLES	x
	LIST OF FIGURES	xii
1	INTRODUCTION	1
	1.1 Introduction	1
	1.2 Problem statement	3
	1.3 Research aim and objectives	4
	1.4 Research Questions	5
	1.5 Significant of Study	5
	1.6 Scope of study	6
2	LITERATURE REVIEW	7
	2.1 Definition of Open Building Towards Satisfaction Development	7
	2.1.1 Open Building Approach	8

2.1.2	What is The Flexible Housing?	12
2.1.3	Basic principles in Open Building	14
2.2	The history of “Open Building”	14
2.3	Concept of Open Building	16
2.4	Classifications of Open Building	18
2.5	Different Executed Projects under Open Building System	24
2.6	Undergoing Researches related to the Open Building	30
2.7	Partition Walls	33
3	METHODOLOGY	40
3.1	Introduction	40
3.2	Research Instruments	40
3.3	Research Procedure	41
4	DISCUSSION OF RESULTS	44
4.1	Introduction	44
4.2	Ordinary Users	46
4.3	Description of the Findings	52
4.3.1	Definition of House Buyers’ Priorities	52
4.3.2	Committing Renovation during the Residency Period	53
4.3.3	Period of Residency after Renovations were done	53
4.3.4	Parts of the house that Residents would like to Change	53
4.3.5	Evaluate the Level of People Satisfaction of their Current House	53
4.3.6	Move the House for the sake of Inflexibility of House	54
4.3.7	Spatial Priorities	54
4.4	Discussion and Data Analyzing	55
4.4.1	The Needs of Using Open Building system in Malaysian Construction Industry	55

4.4.1.1	Changing in the House Layout	56
4.4.1.2	The most Changed Parts of the House	60
4.4.2	The Impact of House Inflexibility on the Residents' Satisfaction of the House	64
4.4.2.1	Priorities for Purchasing a House	64
4.4.2.2	Residents' Satisfaction	64
4.4.2.3	Inflexibility, Reason for Moving from the House	70
4.5	Designing Questionnaire for Architects	72
4.5.1	Architects Experience	73
4.5.2	Architects Qualification	74
4.5.3	Architects' Familiarity with the Concept of Open Building System	77
4.5.4	Open Building in Malaysia	78
4.5.5	Barriers in Developing the Open Building System	80
4.5.6	Measures required to be Done to Develop the Open Building System	84
4.5.7	Extension of Residency through Using the Open Building System	86
4.5.8	The Most Appropriate Materials to be Used in Partition Walls	87
4.5.9	The Most Appropriate Wall Types to be used in the OB System	91
4.5.10	Reliability Analysis	92
5	CONCLUSION5	93
4.1	Overview of the study	93
5.2	Restatement of objectives	94
5.3	Recommendation	96
	REFERENCES	96
	APPENDICES A-B	100-108

LIST OF TABLES

TABLE NO.	TITLE	PAGE
4.1	Respondents' knowledge relating to Construction Industry	48
4.2	Ownership Status of Respondents	50
4.3	Respondents' Storey House	51
4.4	Respondents' Residency Period	55
4.5	Descriptive Statistics of question 3	56
4.6	Change in the House Layout	56
4.7	Period of Changing House Layout	57
4.8	Descriptive Statistics of question 5	59
4.9	Parts of the house which changed	60
4.10	Parts that People Like to Change	61
4.11	Using Partition Walls in the house	62
4.12	Respondents' Priority to Purchase a House	65
4.13	Residential satisfaction	67
4.14	Respondents' Tendency to change the House Layout	68
4.15	Correlation between house capacity and residents dissatisfaction	69
4.16	Descriptive Statistic of question 2 and 3	69
4.17	Inflexible house enforce residents to move	70
4.18	Cronbach's Alpha, Reliability analysis	71
4.19	Cronbach's Alpha, Reliability analysis	71
4.20	Working Experience of Architects	73
4.21	Descriptive Statistics of Working Experience of Architects	74
4.22	Architects' Qualification	74
4.23	Means analysis of qualification	75
4.24	Means and Standard Deviation of Question 5 and 6	77

4.25	Means and Standard Deviation	77
4.26	Barriers on the Way of Open Building Development	83
4.27	Selected Materials to be Used in the Room Layout	90
4.28	Partition walls used in the room layout of Open building	91
4.29	Reliability Statistics of Question 1 to 5	92
4.30	Reliability Statistics of Question 6 to 7	92
4.31	Reliability Statistics of Question 1 and 4	92

LIST OF FIGURES

FIGURE NO.	TITLE	PAGE
2.1	Dwellings that change over time according to owner needs	17
2.2	Decision making levels	18
2.3	A Support is not a skeleton	19
2.4	Infill systems that is integrated with building services	20
2.5	Space homogenization in Central Baheer by Herman Hertzberger	22
2.6	Modified Brand's Building layers	23
2.7	Adaptable building structure	23
2.8	Plan of the apartment building	25
2.9	Plan of the major type of flats with 30cm grid showing the positions of flexible walls	26
2.10	One of the possible floor	27
2.11	50 storey high density living housing, Pinnacle	27
2.12	R-128 house	31
2.13	Structural framework of R-128 house	31
2.14	Bolted connections of R-128 house	32
2.15	Smart Track	38
2.16	Lightweight Concrete Partition	39
2.17	Drywalls	39
3.1	Flowchart of Research Methodology	41

4.1	Theoretical Framework- Design Control Issue and Building Element Issue	45
4.2	Percentage of Respondents' Ethnics	46
4.3	Respondents' knowledge relating to Construction Industry	47
4.4	Monthly Family Income	49
4.5	Ownership Status of Respondents'	50
4.6	Change in the House Layout	57
4.7	Period of Changing House Layout	58
4.8	Parts of the house which changed	60
4.9	Parts that People Like to Change	61
4.10	Using Partition Walls in the house	62
4.11	Respondents' Priority to Purchase a House	65
4.12	Residential satisfaction	67
4.13	Respondents' Tendency to change the House Layout	68
4.14	Working Experience of Architects	73
4.15	Architects' Qualification	75
4.16	Relative fields of Respondents' Working	76
4.17	Experience related to the Interior Design	76
4.18	Familiarity with Open Building	78
4.19	Utilizing the Open Building Concept in Malaysia on the Architects' Point of View	80
4.20	Open Building a solution to extend the residency period	86

CHAPTER 1

INTRODUCTION

1.1 Introduction

Altas (1998) conducted a general research on the flexibility status of current dwelling units in Turkey. He found that based on the particular family structure in Turkey in which the scale of family in terms of members are decreasing, people tend to correspond to their new generated spatial needs in their houses [33]. He found two options available for the users, leave the house and rent a new house or stay in house and try to change the layout. The first option cannot be considerable because there is no control on rents, and rents are increased with the increase in inflation rates. Thus, families have to live in their dwellings for a long period of time, since they lack the economic power to change their dwelling to a bigger or more adequate one. Another emerging problem in housing is the growing demand of residents for better quality housing. While the previous efforts in housing estate have been directed towards meeting the quantitative shortage of dwellings qualitative aspects of housing have gained importance in recent years. Users are getting more conscious of quality issues in housing environments. He investigated more than 380 dwelling units with the age of 16-20 and found that vast majority of them cannot accept any changes due to the ignorance of the architectural obsolescence and structural limitations.

Tatjana, S and Jeremy, T. (2005) studied the basic parameter to develop the implementation of flexible housing design in UK. They believed that the importance of flexible housing interior design can be discussed under the name of ideology, user participation, technology and finance. It is believed that users can be more involved in the design and other stages because flexibility is also a matter of knowledge and management, incorporating users into the entire process and by placing concrete decisions into their hands, buildings and units can respond more directly to changing needs. Additionally, they surveyed the most probable issues which are hindered the process of flexible houses' development [22].

Moreover, in another attempt, Wong J. F. (2010) studies the scenario design requirements and critical dimensions of use-territories in public mass housing in Hong Kong in view of extracting useful patterns for use in future designs. He studies 80 case studies of residential layouts used in Hong Kong to illustrate the kind of problems the majority of the existing residential building stock will face when the need for renewal and upgrade arises. He found that mismatch can happen in furniture-level, spatial organization at the room-level, flat sizes and distribution at the unit-level. The effect of this mismatch is especially significant at the furniture-level and room level as they directly influence the users' behavior and activities inside the units. He also believed that a huge amount of resources such as materials, energy, and time will be wasted out because the flats cannot response to the changing needs and they are become obsolete. He concluded that these problems can be avoided if the architect is more sensible to open building considerations in the design of mass housing layouts [34].

Milica Z and Goran J. (2011) proposed an evaluation method of internal flexibility of housing units in multifamily housing. This method is based on the elements of multi criteria analysis, where the object of evaluation is assessed through a number of physical criteria that are directly related to the concept of flexibility. Housing needs and their level of satisfaction through the spatial organization of the apartment are criteria that determine its use-value. They believed that through controlling these criteria the level of flexibility in the house level can be achieved, these criteria are the orientation of housing unit (one-sided, two-sided or three-sided

orientation), geometry of plan (dispersed or compact form of housing units), structure and size of the flat (relationship between structure and size of the flat and family structure), number and disposition of the entrance (central or peripheral), position of technical services (grouped or individually placed, with the central or peripheral position) and building structure (massive or skeleton structure) [24].

1.2 Problem Statement

Altas (1998) believed that emerging the new spatial demands eventually enforced the users to correspond. These probable responses for the people with medium and low monthly salary could be left the house and rent the a new one. However, due to the inflation and lack of control on the rental money, this option will be rejected for these sort of people so that they would have to stay in the house which is not able to satisfy their needs. He believed that growing demand of residents for better quality housing could make the people suffering for those who tend to stay in their house.

Wong J. F. (2010) believed that a considerable quantity of valuable resources are wasting annually due to knocking down the rigid walls because they cannot satisfy the highly variable spatial needs of the many users. He believes that the basic spatial demands of the users will be changed in the context of the time because of altering the family structure. Tatjana, (2005) believed that the range of responses to these changes is oriented to the culture, climate and the economic base of the family. As a result, new buyers committed to change the layout before moving in, or the current settlers do the desired variations during their residency period.

Wong J. F. (2010) believed that architects can play an important role in minimizing the rigidity of internal space through being sensible to the Open Building concept.

Tatjana, (2003) mentioned house layout flexibility is more economic in the long term because obsolescence of housing stock is limited. If technological systems, service strategies and spatial principles are employed that enable the flexible use of a building, these buildings in turn will last longer, and they will be cheaper in the long run because they reduce the need and frequency for wholesale refurbishment.

Malaysia is considered as a developing country which is facing with a huge surge of increasing population in recent years (Department of Statistics Malaysia) and it is projected to reach more than 38.6 million in 2040. It can be understood that the surge of demand for house will be increased which is equal to the increase of land worth in Malaysia. Therefore, a house which can be capable of responding to the changing needs would be a proper strategy to correspond to the housing needs.

1.3 Objectives

The main aim of the study have been determined to highlight the importance of the Open Building system as a innovative idea which can be considered in some extent as a solution for house inflexibility. The objectives of the study are as follow:

- To evaluate the needs of using Open Building system in Malaysian construction industry and impact of house inflexibility on the residents' satisfaction of the house.
- To find the barriers on the way of developing Open Building system in Malaysia on the architects' point of view and how to overcome the barriers.
- To find the most appropriate partition wall which can be used in the Open Building system in the architectural point of view.

1.4 Research Questions

The objectives of this research study aims at answering the following questions:

Research Question 1) How flexible are the house plan in Malaysia and What is the impact of inflexible house on the people's satisfaction of the house?

Research Question 2) What are the main barriers and challenges to the architects in designing the flexible plan of house?

Research Question 3) what is the best materials and partition wall system which can be used in Malaysia for flexible house (specialists)?

1.5 Significant of Study

The issue of flexibility has been addressed to several studies' subject Friedman (2002), Till and schnider (2007) and Beisi (1995) highlighted the importance of flexible housing strategy for keeping up with the spatial changes in the future of owners.

Generally, people tend to consider some modification in their surrounding environments and life space to achieve satisfaction. This basic demand will be more highlighted when time goes on and new demands will be generated. This research study is an attempt to investigate the flexible housing of dwelling units on residential satisfaction.

Based on the latest records which are revealed by the Department of Malaysian Statistics, the proportion of urban population of Malaysia has been increased from 62% in 2000 to 71% in 2010. Moreover, the population density of

Malaysia is stood at 86 persons per square kilometer in 2010 compared with 71 persons in 2000 [Department of Statistics Malaysia]. This department is also projected that the Malaysian population will reach to more than 38.6 million in 2040. It can be concluded that in the near future the scarcity of land will be increased that is equal to increasing the worth of land. In this coming situation, the majority of people, especially, those who are considered as the low income people would have to stay in their houses for a longer period while new spatial needs are generated for them. The significance of this study is to highlight the importance of new concept and strategy to give the flexibility to the houses in which desired alterations in room layout would be applied with the minimum efforts and fundamental changes in room configuration.

1.6 Scope of the Study

The present study was carried out aiming at assessing overall satisfaction of residents in Malaysia. It also seeks to determine the role of flexibility in designing dwelling units and its impact on the satisfaction. The scope of this research study is limited to the interior partition walls of architectural plan of the houses which are bought. This study is also in compliance to the Malaysia Uniform Building By Law 1972 (UBBL). Furthermore, this study is not entering the mechanical, electrical and structural detail and it also is focused on the single story residential houses. Moreover, it is tried to take the three Malaysian ethnics spatial needs into consideration.

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