The Tendency of Spatial Layout Changes in Design of Terraced Houses in Melaka Tengah, Malaysia

Nurdalila Saji, Fuziah Ibrahim

Universiti Sains Malaysia, Malaysia

0315

The Asian Conference on the Social Sciences 2013

Official Conference Proceedings 2013

Abstract

Terraced house modification has been a trend in recent years. It has been done excessively either with or without consent from the local authorities. However, there are no proper steps taken to overcome this problem. The reason is that terraced house modification has become a necessity for the resident to cater for the growing number of household. Therefore, a research is done in studying the level of modification and the household's preference in terms of economy, comfortability, necessity, psychology and aesthetic. The site of study is selected in Melaka Tengah. The reason for choosing Melaka Tengah as site of study is because no research on terraced house modification had been done in the area before. The data collection technique includes observation, questionnaire surveys and unstructured interview. The site of study includes Taman Sungai Udang, Taman Seri Jati, Taman Seri Cempaka, Taman Paya Rumput Utama, Taman Merbok, Taman Desa Duyung, Taman Cheng Jaya, Taman Bukit Rambai, Taman Aman and Taman Alai Perdana. The data is analysed using descriptive statistical analysis to obtain the demographic profile of the respondents. Chi-Square tests are used to analyse reasons for modification and its relationship with the respondent's profile. Result from the study shows the reason for modification is influenced by number of household, income, race, number of years residing, number of bedrooms, floor plan status awareness, and house position. From the result of the analysis, the researcher suggested a flexible housing design among others as a step to minimise modification.

Key Words: Modification, Terraced House, Changes in design

Introduction

Terrace houses are a row of identical or mirror-image houses share side walls. The first and last of these houses is called an end terrace, or end house or corner house, usually larger than those houses in the middle. Terraced house normally have open spaces at the front and back. Each row may consist of 10 to 12 units depending on the width of the house, as it have to comply with the regulations of the Fire Services Department that each row shall not exceed 130 feets. (Malaysia My Second Home, 2013)

The disadvantages of mass houses are often designed for a typical user, with typical abilities in mind, for the typical needs of today, without considering the future changes of the user (Baldwin and Tomita 2007) and often, the housing design is the lack of social and cultural considerations and insensitive to local context (Parva and Dola, 2007; Hashim et al. 2009). Mismatch between the current house and the residents' needs, preference and aspiration may lead to adjustment of aspirations, or adjustment of the current house through modification or relocation (Baum and Hassan 1999). Tipple (1996) claimed that housing transformation could contribute to sustainable development in the urban and rural environments. He focused on architectural opportunities in terms that housing transformation that involves occupiers in their houses is capable to increase households' affection at their houses. Therefore, the sense of belonging is higher in transformed houses and the residents of such houses have better feelings when living in their houses (Tipple 1996).

Literature Review

Modification in general

Akalin et al. (2008) grouped housing modification into two different types that are intrinsic, which relates to spatial and technical functions, and extrinsic, which refers to aesthetic act. Marcus & Sarkissian (1986) suggested design guidelines which promotes and encourages residential personalisation through territorial expression, added privacy, articulated façade, personal additions, component replacement and entry personalisation.

Abu-Ghazzeh (2000) defined personalisation as a way people modify their environment to make it distinctly theirs. At the same time high density environments increase the need for privacy which increases the need people feel to mark their territory and to create more personalized markings (Abu-Ghazzeh, 2000). According to Oulasvirta & Blom (2007), personalisation is a normal behaviour in human activity such as decorating or beautifying, altering, modifying and adapting. Personalisation occurs when there is any modification or addition to the exterior part of the house by the residents, including the garage and the front or back yard (Marcus & Sarkissian 1986)

Modification in terms of aesthetic reasons

Accordingly Saruwono (2010) aptly suggests that the beauty of renovation is that people are free to express themselves, communicating with the outside world about who they are and that people did what they think best from the individual point of view which is supposed to lead a more desirable living environment. The renovations done involving the front area to

the back area, from the living area to the kitchen and the scale of the renovation are both major and minor. The different type of renovation done showed us that the people are getting more alert and attentive about design aspects and they wanted a better house to live their lives. (Jamel, M. A & Utaberta, 2011) for the side portion terrace house modifications, besides for personal needs, the modifications are also for aesthetic appeal. (Sazally, 2012)

Individual aesthetic preferences and the taste for "style" vary greatly. Designers make design choices based on their own preferences or that of the developers'. At times, with the intention to appear attractive, some buildings are designed with exaggerated style which is not connected to the visions of consumers (Rukwaro & Olima 2003).

Modification in terms of economic reasons

According to Apolonija in Zvirblyte, 2011, a renovation costs a lot of money, hence the quality of life has to be improved and the energy bills lowered considerably. There were some examples, when some communities have renovated their houses, but the works were done not properly- some significant defects appeared later on and the community couldn't solve this without paing extra money, even though the guarantee term hasn't expired yet, but the company that had done all those works got bankrupted. (Zvirblyte, 2011)

Recession may cause distress and hold back plans from renovating the house. But the homeowner can actually reverse that mood into a brighter one if they knew how to take advantage of the situation. (McKenna, 2013) A house renovation for terrace house has become a trend in Malaysia due to sustained economic development and the increase of the living standard. Most Malaysians renovate their homes to increase the value of the property. (Ahmad, 2011)

Modification in terms of psychological reasons

Housing may be viewed from different perspectives. Authors including Egalius (1980), Mickelson (1977) classify housing into physical, social and psychological dimensions. User's satisfaction in a house, although dependent on economic or social status, is related to the gratification of the user's higher psychological expectations such as intimacy, love, sense of belonging and freedom. (Zavei, 2012) It is important therefore that investigation into a person's mass housing preferences be undertaken in two important phases of home making, namely, the design phase of the initial housing units, and the future personalization works by the occupants. (Zavei, 2012)

Mobility, as one of most highlighted characteristics of the modern lifestyle, leads to "placelessness," which causes lack of place attachment (Tall, 2007; Fullilove, 2004; Norberg-Schulz, 1988). Place attachment is one of the most influential factors in humans' psychological health, and is therefore powerful in constructing an individual's identity (Tuan, 2007, Oliver, 2006). Also, individualization or privatization is another phenomenon of the modern community leading to an individual feeling less attachment to the community, thereby weakening their sense of responsibility to society (Utekhin, 2007).

People are also more exposed to up-to-date architecture and appealing interior design and many see their house as an opportunity for property investment. Any alteration works should overcome or prevent adverse psychological and physiological reactions to occupants of the property. (Isnin, 2012)

Modification in terms of necessity

Occupants living in older buildings, most of which were built over 35 years ago, are more likely to undertake a major renovation on their homes (Nair, Gustavsson, & Mahapatra, 2010). Consequently, the functionality of existing residential buildings is becoming increasingly insufficient for meeting occupants' need, with the kitchen, dining area and clothes-drying space being typically unsatisfactory (Salleh, 2008). Renovation is one of the most direct ways to eliminate functional deficiencies. (Zhang, 2012)

In general the housing modifications were to provide convenience for daily activities, privacy and social interaction. (Rahim, 2012) Housing modification is an on-going effort to improve the physical living environment and varied according to individual family needs and most modifications were undertaken at the stage of family life cycle when the children reached adolescence, a reflection of the importance to provide privacy in term of separate sleeping and spaces for increased. (Rahim, 2012)

Modification in terms of comfortability

The demand for comfort conditions in buildings are significantly increased as a result of exposure to uncomfortable outdoors (Ahmed, 2003). Most Malaysians make the house more comfortable to live by adding the area of the space, a new section in the house for example adding the number of the rooms, changing the colour of the house and increasing the security level of the house by fixing grilles at the entrance of opening in the house. (Ahmad, 2011)

The home must be in a state which is suitable to live in. This can be achieved through responsible design, according to relevant guidelines and regulations set by the authority, ensuring the health and safety of the occupants. Homes which do not meet the minimum standards will result in discomfort and eventually create stress and dissatisfaction among the users. (Vischer, 2007)

Methodology

The double storey terraced houses comprised the majority of house type built and the most popular form landed property in the country. 511 houses were selected randomly from a developed urban housing development in Melaka Tengah. This includes Taman Sungai Udang, Taman Seri Jati, Taman Seri Cempaka, Taman Paya Rumput Utama, Taman Merbok, Taman Desa Duyung, Taman Cheng Jaya, Taman Bukit Rambai, Taman Aman and Taman Alai Perdana. The objective of this study is to examine the reasons behind terraced housing modification and the factors influencing the modification. As only homeowners may make physical modification to the house, owner-occupied properties were preferred (Marcus &

Sarkissian, 1986), if the modified house is a rental property; the information of the house was acquired using the information given by the tenant. The houses were selected through observation which has been made by the researcher to select the houses that has been modified. Owner-occupied houses will allow the researcher to observe the physical trace and study how the spaces in the homes were used. Another important selection criterion is that the property must have been modified or renovated. Unmodified homes were filtered out by observation. It was decided that the best method for this study was observation and informal interview. A standardized format sheet was devised to record the observation process. It covers various attributes of the house ranging from spatial modification, materials and features modification. Informal interview was found to be very informative as the homeowner will not only give a brief history and descriptions of the modifications but also give glimpse into their life, how family activities are carried out and how do they attend to the guest. The descriptions were all digitally recorded to assist the researcher in analysis. Photographs of any physical changes made to the home were also taken whenever allowed.

Demography

Table 1

***Taman* (Housing Area)**	**Frequency**	**Percent**
1. Sungai Udang	38	7.4
2. Seri Jati	51	10
3. Seri Cempaka	46	9
4. Paya Rumput Utama	58	11.4
5. Merbok	68	13.3
6. Desa Duyung	57	11.2
7. Cheng Jaya	49	9.6
8. Bukit Rambai	54	10.6
9. Aman	44	8.6
10. Alai Perdana	46	9

Taman (Housing Area)

Majority of the respondent are from Taman Merbok which is 68 (13.3%) respondents. Followed by Taman Paya Rumput Utama, Desa Duyung, Bukit Rambai and Seri Jati 58(11.4%), 57(11.2%), 54(10.6%) and 51(10%) respondents respectively while the rest of the housing areas consists below than 50(10%) of respondents.

Table 2

No. of Household	Frequency	Percent (%)
1. 2-4 people	131	21.6
2. 5-7 people	307	50.1
3. 8-10 people	73	14.3
Household Income	**Frequency**	**Percent (%)**
1. <RM3000	42	8.2
2. RM3000-RM4000	197	38.6
3. RM4001-RM5000	142	27.8
4. RM5001-RM6000	69	13.5
5. RM6001-RM7000	37	7.2
6. RM7001-RM8000	13	2.5
7. RM8001 & above	11	2.2
Race	**Frequency**	**Percent (%)**
1. Malay	425	83.2
2. Chinese	82	16
3. Indian	4	0.8
No. of Years Residing	**Frequency**	**Percent (%)**
1. <5 years	78	15.3
2. 5-10 years	338	66.1
3. 11-15 years	95	18.6
Floor Plan (Approved)	**Frequency**	**Percent (%)**
1. Yes	436	85.3
2. No	25	4.9
3. Uncertain	50	9.8
House Position	**Frequency**	**Percent (%)**
1. Conner Lot	96	18.8
2. Intermediate lot	384	75.1
3. End lot	31	6.1

Other characteristic of the household

Table 2 shows other characteristic of the household as a demographic data of the respondents. In majority, number of household consist of 5 to 7 people which is 307(50.1%), the household income is between RM3000 to RM4000 which is 197(38.6%), majority of respondents are Malay 425(83.2%), 338(66.1%) of the respondents have been residing from 5 to 10 years in their housing area, 436(85.3%) of the respondents have an authorised floor plan and majority of the respondent's house position is an intermediate lot which applies to 384 people or 75.1% of the respondents.

Reasons for modification

Table 3

Economically	Frequency Score (%)					Mean Score
	1	2	3	4	5	
1. I modify my house because I have my own / family savings for home modification.	135 (26.4)	52 (10.2)	45 (8.8)	197 (38.6%)	82 (16)	3.08
2. I modify my house because I have approval for bank loans	81 (15.9)	47 (9.2)	58 (11.4%)	178 (34.8)	147 (28.8)	3.51
3. I modify my house because I have received government loan	252 (49.3)	98 (19.2)	48 (9.4)	63 (12.3)	50 (9.8)	2.14
4. I modify my house because it is better and cheaper than buying a brand new house.	44 (8.6%)	60 (11.7)	61 (11.9)	226 (44.2)	120 (23.5)	3.62

Reasons for modification in terms of economy

Based on the value of mean, the respondent chose items 2 and 4 as the prime reason for modification after the house is constructed. The values of mean are 3.51 and 3.62 respectively.

Table 4

Aesthetically	Frequency Score (%)					Mean Score
	1	2	3	4	5	
1. I modified my house to obtain a better and beautiful façade	45 (8.8)	102 (20)	44 (8.6)	197 (38.6)	123 (24.1)	3.49
2. I modify my house to avoid the standard repetitive design	211 (41.3)	138 (27)	72 (14.1)	54 (10.6)	36 (7)	2.15
3. I modify my house to obtain comfortability and uniqueness of the interior design	42 (8.2)	90 (17.6)	53 (10.4)	202 (39.5)	124 (24.3)	3.54
4. House modification is essential for me because the original design is inappropriate	80 (15.7)	135 (26.4)	84 (16.4)	136 (26.6)	76 (14.9)	2.99
5. I modified my house to express my individuality and personality	68 (13.3)	134 (26.2)	87 (17)	153 (29.9)	69 (13.5)	3.04

Reasons for modification in terms of aesthetic

Based on the value of mean, the respondent chose items 1 and 3 as the prime reason for modification after the house is constructed. The value of mean is 3.49 and 3.54 respectively.

Table 5

Psychologically	Frequency Score (%)					Mean Score
	1	2	3	4	5	
1. I modified my house because I was influenced by the surrounding, (the houses in the neighbourhood had changed as well)	148 (29)	156 (30.5)	96 (18.8)	84 (16.4)	27 (5.3)	2.39
2. I modified my house because I had no choice (I did not want to move because I am attached to the house)	41 (8)	92 (18)	104 (20.4)	158 (30.9)	116 (22.7)	3.42
3. I modified my house because I am well aware of the regulations set by the authorities regarding house modification	24 (4.7)	76 (14.9)	85 (16.6)	231 (45.2)	95 (18.6)	3.58
4. I modified my house because I support housing modification and renovation	32 (6.3)	76 (14.9)	81 (15.9)	197 (38.6)	125 (24.5)	3.6
5. I modified my house to indicate my status in the community	224 (43.8)	110 (21.5)	83 (16.2)	62 (12.1)	32 (6.3)	2.15

Reasons for modification in terms of psychology

Based on the value of mean, the respondent chose items 3 and 4 as the prime reason for modification after the house is constructed. The value of mean is 3.58 and 3.6 respectively.

Table 6

Necessity	Frequency Score (%)					Mean Score
	1	2	3	4	5	
1. I modified my house to maintain the house and to avoid obsolescent	25 (4.9)	28 (5.5)	43 (8.4)	220 (43.1)	195 (38.2)	4.04
2. I modified my house to cater for the growing number of household	77 (15.1)	78 (15.3)	49 (9.6)	180 (35.2)	127 (24.9)	3.4
3. I modified my house to expand certain spaces in my house	27 (5.3)	45 (8.8)	19 (3.7)	235 (46)	185 (36.2)	3.99
4. I modified my house to eliminate certain spaces in my house	194 (38)	140 (27.4)	51 (10)	77 (15.1)	49 (9.6)	2.31
5. I modified my house to divide certain spaces in my house	103 (20.2)	153 (29.9)	40 (7.8)	132 (25.8)	83 (16.2)	2.88
6. I modified my house to extend certain areas	27 (5.3)	32 (6.3)	22 (4.3)	257 (50.3)	173 (33.9)	4.01
7. I modified my house to rearrange certain spaces in my house	81 (15.9)	139 (27.2)	41 (8)	162 (31.7)	88 (17.2)	3.07
8. I modified my house to fulfill religious aspect and culture of my household	62 (12.1)	64 (12.5)	183 (35.8)	125 (24.5)	77 (15.1)	3.18

Reasons for modification in terms of necessity

Based on the value of mean, the respondent chose items 1, 3 and 6 as the prime reason for modification after the house is constructed. The values of mean are 4.04, 3.99 and 4.01 respectively.

Table 7

Comfortability (Quantity)	Frequency Score (%)					Mean Score
	1	2	3	4	5	
1. The number of bedrooms in my house is sufficient	69 (13.5)	130 (25.4)	8 (1.6)	212 (41.5)	92 (18)	3.25
2. The number of bathrooms and toilets in my house is sufficient	42 (8.2)	83 (16.2)	3 (0.6)	278 (54.4)	105 (20.5)	3.63
3. The number of stores / utility rooms in my house is sufficient	47 (9.2)	159 (31.1)	32 (6.3)	213 (41.7)	60 (11.7)	3.16
4. The number of guest rooms in my house is sufficient	66 (12.9)	115 (22.5)	47 (9.2)	202 (39.5)	81 (15.9)	3.23

Reasons for modification in terms of comfortability (quantity)

Based on the value of mean, the respondent chose items 2 as the prime reason for modification after the house is constructed. The value of mean is 3.63.

Table 8

Comfortability (Width)	Frequency Score (%)					Mean Score
	1	2	3	4	5	
1. The width of bedrooms in my house is appropriate	43 (8.4)	97 (19)	21 (4.1)	274 (53.6)	76 (14.9)	3.48
2. The width of living room in my house is appropriate	43 (8.4)	97 (19)	19 (3.7)	284 (55.6)	68 (13.3)	3.46
3. The width of dining room in my house is appropriate	38 (7.4)	74 (14.5)	25 (4.9)	304 (59.5)	70 (13.7)	3.58
4. The width of kitchen in my house is appropriate	180 (35.2)	183 (35.8)	20 (3.9)	112 (21.9)	16 (3.1)	2.22
5. The width of bathrooms and toilet in my house is appropriate	58 (11.4)	98 (19.2)	20 (3.9)	289 (56.6)	46 (9.0)	3.33
6. The width of guest room in my house is appropriate	34 (6.7)	88 (17.2)	54 (10.6)	267 (52.3)	68 (13.3)	3.48
7. The width of balcony in my house is appropriate	22 (4.3)	55 (10.8)	62 (12.1)	285 (55.8)	87 (17)	3.70
8. The width of car porch in my house is appropriate	69 (13.5)	106 (20.7)	24 (4.7)	259 (50.7)	53 (10.4)	3.24
9. The width of store and utility room in my house is appropriate	38 (7.4)	101 (19.8)	58 (11.4)	257 (50.3)	57 (11.2)	3.38

Reasons for modification in terms of comfortability (width)

Based on the value of mean, the respondent chose items 1, 2, 3, 6 and 7 as the prime reason for modification after the house is constructed. The values of mean are 3.48, 3.46, 3.58, 3.48 and 3.70 respectively.

Table 9

Comfortability (Alternative)	Frequency Score (%)					Mean Score
	1	2	3	4	5	
1. I convert my guest room into my children's bedroom	186 (36.8)	58 (11.4)	36 (7.0)	167 (32.7)	64 (12.5)	2.74
2. I use the living room as the guest's sleeping area and my children's sleeping area	161 (31.5)	81 (15.9)	34 (6.7)	153 (29.9)	82 (16)	2.83
3. I use the utility room as the guest's sleeping area and my children's sleeping area	286 (56)	118 (23.1)	49 (9.6)	49 (9.6)	9 (1.8)	1.78

Reasons for modification in terms of comfortability (alternative)

Based on the value of mean, there are no items are chosen from respondent as the prime reason for modification after the house is constructed.

Analysis Result

The analysis is carried out to study the relationships between the respondent's background data / profile and the reasons of modification. Chi Square test is used to discover if there is a relationship between the two categorical variables.

Total number of Household

Table 10

Aspect	Chi Square	Df	P value
Economy	17.613	8	0.024*
Aesthetic	20.509	8	0.009*
Psychology	44.379	8	0.000*
Necessity	30.575	8	0.000*
Comfortability	27.876	8	0.064
H_0: There is no relationship between reason of modification and total number of household. H_1: There is a relationship between reason of modification and total number of household. Level of significant, α=0.05			

Result: H_0 is rejected for the aspect of economy, aesthetic, psychology and necessity because p value is less than 0.05. It can be concluded that a relationship exists between number of household and reasons of modification in terms of economy, aesthetic, psychology and necessity.

There are relationships between reason of modification and total number of household. It seems that in the Chi-Square test total number of household has a significant relationship with comfortability. The P value was 0.064 which is higher than 0.05 (level of significant). The other factors are rejected. This indicates the comfortability of the residents is influenced by the total number of household. Comfortability is related to the number of household because it affects their condition of living. This includes the space in the house such as

bedrooms, bathrooms, store, living room, dining room, kitchen, balcony and even the car porch. When there are too many people cramped in one space, it affects their comfortability thus, larger and multiple space is needed.

Household Income

Table 11

Aspect	Chi Square	Df	P value
Economy	98.870	24	0.000*
Aesthetic	63.442	24	0.000*
Psychology	53.474	24	0.001*
Necessity	32.919	24	0.106
Comfortability	169.331	24	0.000*
H_0: There is no relationship between reason of modification and household income. H_1: There is a relationship between reason of modification and household income. Level of significant, α=0.05			

Result: H_0 is rejected for the aspect of economy, aesthetic, psychology and comfortability because p value is less than 0.05. It can be concluded that a relationship exists between the household income and reasons for modification in terms of economy, aesthetic, psychology and comfortability.

Necessity has significant relationship with the household income. The score was 0.106 and was higher than 0.05 (level of significant). The other factors are rejected. This indicates that necessity or needs of the residents are indeed influenced by the household income.

Total number of children

Table 12

Aspect	Chi Square	Df	P value
Economy	48.220	16	0.000
Aesthetic	48.662	16	0.000
Psychology	57.447	16	0.000
Necessity	91.990	8	0.000
Comfortability	108.856	36	0.000
H_0: There are no relationship between reason of modification and total number of children. H_1: There are relationship between reason of modification and total number of children. Level of significant, α=0.05			

Result: H_0 is rejected on all aspect of modification because p value is less than 0.05. It can be concluded that a relationship exists between number of children and reasons of modification in terms of economy, aesthetic, psychology, necessity and comfortability.

The total number of children however does not influence any of the factors mentioned above. The P value resulted in 0 and the expected significant value was supposed to be higher than 0.05. Necessity in this study is defined as shelter. The need to improve one's living is to improve their shelter or in other term their house. The residents have the tendency of

modifying their houses to improve them, to cater their families and to either expand, eliminate, divide, extend, or even rearrange certain spaces in their house. All these factors are influenced by the total number of children to accommodate them and to satisfy their families.

Race

Table 13

Aspect	Chi Square	Df	P value
Economy	16.268	8	0.039*
Aesthetic	13.938	8	0.083
Psychology	35.829	8	0.000*
Necessity	8.017	8	0.432
Comfortability	9.207	18	0.955
H_0: There is no relationship between reason of modification and race. H_1: There is a relationship between reason of modification and race. Level of significant, α=0.05			

Result: H_0 is rejected for the aspect of economy and psychology because p value is less than 0.05. It can be concluded that a relationship exists between race and reasons of modification in terms of economy and psychology.

There is a relationship between Aesthetic, Necessity and Comfortability with race. Their P values are more than 0.05 which was 0.083, 0.432 and 0.955 respectively. This indicates aesthetic, necessity and comfortabily are influenced by race. Every race have different opinions in house modification. They are either influenced by their custom, tradition or even religion. In example, a Chinese family is known to analyse their house using the energy map and the Bagua which is an octagonal grid containing the symbols of the I Ching, the ancient oracle on which feng shui is based. Knowing the bagua of the house will help the household understand the connection of specific feng shui areas of their house to specific areas of your life. So it can be concluded that every race has different aesthetic views, necessity and comfortability.

No of years residing

Table 14

Aspect	Chi Square	Df	P value
Economy	11.449	8	0.178
Aesthetic	9.071	8	0.336
Psychology	12.775	8	0.120
Necessity	18.390	8	0.018*
Comfortability	56.322	18	0.000*
H_0: There is no relationship between reason of modification and number of years residing. H_1: There is a relationship between reason of modification and number of years residing. Level of significant, α=0.05			

Result: H_0 is rejected for the aspect of necessity and comfortability because p value is less than 0.05. It can be concluded that a relationship exists between number of years residing and reasons of modification in terms of necessity and comfortability.

H_0 is rejected for the aspect of necessity and comfortability because p value is less than 0.05. It can be concluded that the relationship exists between number of years residing among aspect of economy, aesthetic and psychology. Number of years residing is associated with economy which is the resident's income, aesthetic (their views on concerning the appreciation of beauty or good taste) and psychology (social behavior). Throughout the years of living in the house, residents have a tendency to upgrade their house when they have a steady source of income, influenced by the surrounding which confirmed the relationship with psychology and aesthetic. The surrounding makes them realize (psychology) that they also wanted to modify their houses thus, when the modification is completed, it points out the aesthetic views on design sourced (economy) by their income.

No of bedrooms

Table 15

Aspect	Chi Square	Df	P value
Economy	9.434	8	0.307
Aesthetic	19.696	8	0.012*
Psychology	16.845	8	0.032*
Necessity	12.059	8	0.149
Comfortability	19.376	18	0.369
H_0: There is no relationship between reason of modification and number of bedrooms. H_1: There is a relationship between reason of modification and number of bedrooms. Level of significant, α=0.05			

Result: H_0 is rejected for the aspect of aesthetic and psychology because p value is less than 0.05. It can be concluded that a relationship exists between number of bedrooms and reasons of modification in terms of aesthetic and psychology.

Factors aesthetic and psychology are influenced by the number of bedrooms in the house. The same goes for the number of bedrooms in the house. The resident's social behaviour (psychology) signifies their support on modification and that they are attached to the surrounding neighbourhood to have influence the tendency of changes in the number of bedroom. Aesthetically, the reasons the two variables are related is that the residents have their certain opinion on the design.

Total no. of vehicles

Table 16

Aspect	Chi Square	Df	P value
Economy	33.423	12	0.001
Aesthetic	43.670	12	0.000
Psychology	44.384	12	0.000
Necessity	68.117	12	0.000
Comfortability	112.999	27	0.000
H_0: There is no relationship between reason of modification and total number of vehicles. H_1: There is a relationship between reason of modification and total number of vehicles. Level of significant, α=0.05			

Result: H_0 is rejected for the all aspect of modification because p value is less than 0.05. It can be concluded that a relationship exists between total number of vehicles and reasons of modification in terms of economy, aesthetic, psychology, necessity and comfortability.

There are no relationship between reason of modification and total number of vehicles. Apparently, the number of vehicles is not influenced by the reason for modification. The modification of the car porch does not affect the number of vehicles whatsoever.

Floor Plan Status Awareness

Table 17

Aspect	Chi Square	Df	P value
Economy	57.142	8	0.000*
Aesthetic	45.741	8	0.000*
Psychology	3.963	8	0.860
Necessity	26.514	8	0.001*
Comfortability	54.446	18	0.000*
H_0: There is no relationship between reason of modification and floor plan status awareness. H_1: There is a relationship between reason of modification and floor plan status awareness. Level of significant, α=0.05			

Result: H_0 is rejected for the aspect of economy, aesthetic, necessity and comfortability because p value is less than 0.05. It can be concluded that a relationship exists between floor plan approved by the local authorities and reasons of modification in terms of economy, aesthetic, necessity and comfortability.

There is a relationship between reason of modification (psychologically) and floor plan status awareness is either the floor plan is approved by the local authorities or not. In terms of psychology, residents are well aware of their situations on house modifications. They are also well aware of the regulations set by the authorities regarding house modification.

House Position

Table 18

Aspect	Chi Square	Df	P value
Economy	5.180	8	0.738
Aesthetic	14.552	8	0.068
Psychology	9.725	8	0.285
Necessity	21.279	8	0.006*
Comfortability	41.871	18	0.001*
H_0: There is no relationship between reason of modification and position house. H_1: There is a relationship between reason of modification and position house. Level of significant, α=0.05			

Result: H_0 is rejected for the aspect of necessity and comfortability because p value is less than 0.05. It can be concluded that a relationship exists between house position and reasons of modification in terms of necessity and comfortability.

Finally, relationship exists between position of the house among aspect of economy, aesthetic and psychology. Position of the house influences the economy because the price of houses is different from each type. The corner lot is especially pricier since it covers more land than the intermediate and end-lot. Reasons for aesthetic and psychology are similar to the relation with number of bedroom.

Table 19

Relationship	Economy	Aesthetic	Psychology	Necessity	Comfortability
Total number of household					√
Household income				√	
Total number of children					
Race		√		√	√
Number of years residing	√	√	√		
Number of bedrooms	√			√	√
Total number of vehicles					
Floor plan status			√		
House position	√	√	√		

Table 27 shows the relationship between reason of modification and household's aspects of living. The marked box (√) indicates that the relationship exists between the two variables, while the unmarked box indicated that there is no relationship exist whatsoever.

Summary

In summary, this paper discusses reasons behind modification and the factors influencing the modifications. The tendency of terraced house modifications is based on five factors which are economy, aesthetic, psychology, necessity and comfortability. Economically, residents modified their houses because they have their own source of income either their own family savings, bank loans or even government loans. 226 (44.2%) agreed that they modified their houses because it is cheaper than buying a new house. In terms of aesthetic, the residents

modified their houses to obtain a better façade, interior design and to express their own personal taste in design. They also strongly disagree 211 (41.3%) on maintaining the standard repetitive design.

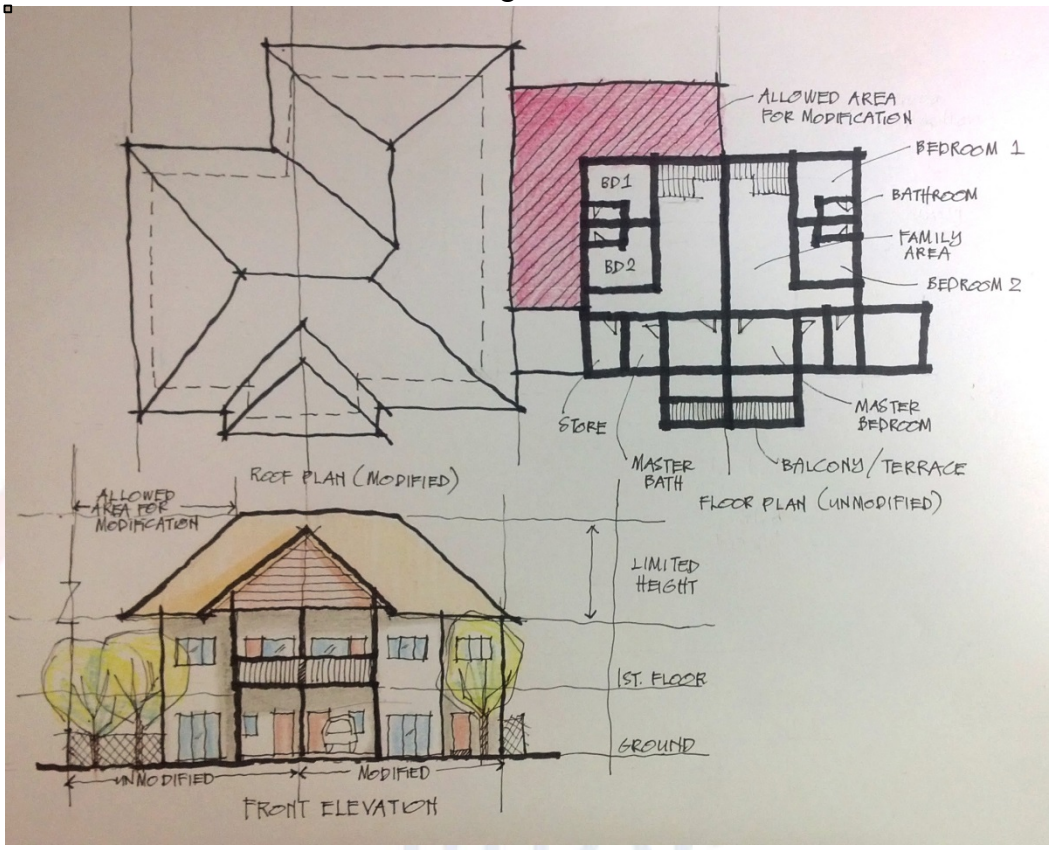
Surprisingly 224 (43.8%) respondents modified their houses to indicate their status in the community. Psychologically, they also modified their houses because they support the act of modification, had been attached to the sense of living in the particular area and fully understand the regulations set by the authorities regarding terraced house modification. In terms of necessity, majority of the respondents modified their houses to avoid obsolescent, cater for the growing number of household, expand, extend and rearrange certain spaces in the house.

Finally, in terms of comfortability, many respondents disagrees 183 (35.8%) with the width of the kitchen and the number of bedrooms provided in their house 278 (54.4%). This shows that space are critically needed in the terraced house. Since terraced house is bound with several rules and requirements upon modification, having the house modified is difficult for the residents. Therefore, it resulted in unauthorised modifications done in desperate need for space.

Recommendation

Flexible housing can reduce costs over the long term by extending the lifecycle of public housing. Schneider and Till (2005) encourage the public sector to recognize the long-term economic advantages of flexible design: "(If) technological systems, service strategies and spatial principles are employed that enable the flexible use of a building, these buildings will in turn last longer." Flexible design projects need not be expensive and complex, requiring expertise unavailable locally, as some have been in the past. Furthermore, if flexible design truly responds to the social and cultural needs of its inhabitants, their satisfaction will translate into increased housing longevity. Schneider and Till (2005) indicate that flexibility includes long-term economic savings "such as a higher appreciation of the dwelling on the part of the user, less occupant fluctuation, and the ability to react quickly to changing needs or wants of the existing or potential inhabitants and the market."

Figure 1



Flexible terraced housing designed by the researcher

The author / researcher came out with an idea of flexible design housing with a certain area in the terraced house being preserved for future modification. The idea is, to allow the homeowners to modify certain area of the house so that it does not disturb the balance of the house or the unique design of the standard repetitive design. The allowed area for modification are coloured in red (see figure 1). Such design could benefit the residents and the authorities since, the allowed area is located in the back, any excessive modification could be pin pointed easily by the authorities thus, make easier for them to take any necessary action for violating the rules. As for the residents, the modification does not disturb the housing area as much as it would in regular renovation works which focuses the frontage design of the house. However, the contrast of this idea is that since personalization and modification supports individual taste in design, not allowing the homeowners to modify the front façade would be inconvenience since the front façade is the area they would like to change the most.

References

Abu-Ghazzeh, T. M. (2000). Environmental Messages in Multiple-family Housing: Territory and Personalization. Landscape Research, 25(1), para.97-115.

Ahmad, H., M. Y. Fadlie, et al. (2011). The Means of Escaping for Occupants for Renovation Works of Terrace Houses in Malaysia. Procedia Engineering 20(0): 188-192.

Ahmed, K. S. (2003). Comfort in urban spaces: Defining the Boundaries of Outdoor Thermal Comfort for the Tropical Urban Environments. Energy Build. 35:103– 110.

Akalin, A., Yildirim, K., Wilson, C. & Kilicoglu, O. (2008) Architecture and engineering students' evaluations of house façades: Preference, complexity and impressiveness. Journal of Environmental Psychology, In Press, Corrected Proof.

Baldwin, E. & Tomita, S. (2007) Housing in Response to the Human Life Cycle. The 2nd International Conference on Technology and Aging (ICTA). Toronto.

Baum, S. & Hassan, R. (1999) Home Owners, Home Renovation and Residential Mobility. Journal of Sociology, 35, 23.

Egelius, M. (1980). Housing and Human Needs: The Work of Ralph Erskine. Architecture for People: Explorations in a New Humane Environment. B. Mikellides. London, Studio Vista**:** 135-148.

Fullilove, M. (2004). Root shock: How Tearing up City Neighborhoods Hurts America and What We Can Do About it. New York: Ballantine books.

Isnin, Z., R. Ramli, et al. (2012). Sustainable Issues in Low Cost Housing Alteration Projects. Procedia - Social and Behavioral Sciences 36(0): 393-401.

Jamel, M. A and Utaberta, N. (2011) House Renovations and Extensions in Malaysia: An Investigation of Mechanical Changes and Modification of House in Klang Valley, Malaysia.

Malaysia My Second Home. Types of Houses in Malaysia. Retrieved April 23th 2013. From: http://www.mymm2h.com/property/type-of-houses.html

Marcus, C. C. & Sarkissian, W. (1986) Housing as if people mattered : Site design guidelines for medium-density family housing, Berkeley and Los Angeles, California, University of California Press.

McKenna, J. (2013) Renovate During The Wake Of Economic Depression. Retrieved 8 January 2013. From: http://articles.submityourarticle.com/renovate-during-the-wake-of-economic-depression-309161

Michelson, W. (1977). Environmental choice, human behaviour and residential satisfaction. New York, Oxford University Press.

Nair, G., Gustavsson, L., & Mahapatra, K. (2010). Factors influencing energy efficiency investments in existing Swedish residential buildings. Energy Policy, 38(6), 2956-2963

Norberg-Schulz, C. (1988). Architecture: Meaning and place. New York: Rizzoli International.

Oliver, P. (2006). The Cultural Context of Shelter Provision. In P. Oliver (Ed), Built to meet needs: Cultural issues in vernacular architecture (pp. 185-197). Italy: Architectural press.

Oulasvirta, A., & Blom, J. (2008). Motivations in Personalisation Behavior. Interacting with Computers, 20 (1), 1-16.

Parva, M. and K. Dola (2010). Differences between post-earthquake housing in rural and urban area. 1st International Conference on Rural Settlements: Housing and Fabric. Tehran. Iran

Rahim, Z. A. and A. H. Hashim (2012). Adapting to Terrace Housing Living in Malaysia. Procedia - Social and Behavioral Sciences 36(0): 147-157.

Rukwaro, R. W. and W. H. A. Olima (2003). Developer Profits Undermine Residents' Satisfaction in Nairobi's Residential Neighbourhood: Implications for Local Government in Kenya. Habitat International 27: 143-157.

Salleh, A.G. (2008). Neighbourhood Factors in Private Low-Cost Housing in Malaysia. Habitat International, 32, 485-493.

Saruwono, M. B. (2010) Shouting in Silence: Expression of self in private homes. A paper presented in Asean Conference on Environmental Behaviour, Kuching, Sarawak.

Sazally, S. H., E. O. H. Omar, et al. (2012). Personalisation of Terraced Houses in Section 7, Shah Alam, Selangor. Procedia - Social and Behavioral Sciences 49(0): 319-327.

Schneider, Tatjana, & Till, J. (2005). Flexible Housing: Opportunities and Limits, Architectural Research Quarterly, vol.9, no.2, pp.157-66. Cambridge UP Cambridge, Great Britain.

Tall, D. (2007). Dwelling: Making peace with space and place. In B. Miller (Ed), Housing and dwelling: Perspectives on modern domestic architecture (pp. 424-431). New York: Routledge.

Tipple, A. G. (1996). Housing Extensions as Sustainable Development. Habitat International: 367-376.

Tuan, Y. F. (2007). Attachment to homeland. In B. Miller (Ed.), Housing and Dwelling: Perspective on modern domestic architecture (pp. 408-415). New York: Routledge.

Utekhin, I. (2007). Filling dwelling place with history: Communal apartment in St Petersburg. W b. Miller (Red.), Housing and Dwelling: Perspective on modern domestic architecture (Strony 415-424). New York: Routledge.

Vischer, J. C. (2007). The concept of environmental comfort in workplace performance. Ambiente Construido, Porto Alegre, 7(1), 21-34.

Zhang, H. and S. L. Lei (2012). An Assessment Framework for the Renovation of Existing Residential Buildings Regarding Environmental Efficiency. Procedia - Social and Behavioral Sciences 68(0): 549-563.

Zvirblyte, J. (2011) Socio-economic effects of house renovation in Lithuania. The case in Kaunas. Master's Thesis. Department of Developing and Planning: Denmark.

iafor

iafor