

**FACTORS INFLUENCING THE MODIFICATION OF THE
SINGLE STOREY TERRACED HOUSE DESIGN IN MELAKA
TENGAH**

by

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LIST OF ABBREVIATIONS

ANOVA	Analysis of variance (ANOVA) is a collection of statistical models used to analyse the differences between group means and their associated procedures (such as "variation" among and between groups), developed by R.A. Fisher.
Bath. 1	Bathroom 1
Bath. 2	Bathroom 2
Bed. 1	Bedroom 1
Bed. 2	Bedroom 2
Bedr.	Bedroom
BY	Backyard
Child.	Number of children
CMA	Comparative Market Analysis
DBKL	Dewan Bandaraya Kuala Lumpur
Din.	Dining room
EPF	Employees Evident Fund
Fam.	Family area
FL	Front Lawn
FP	Floor plan status

HH	Number of household
Income	Household income
Kit.	Kitchen
LA	Local Authorities
Liv.	Living room
LS	Lifestyle
Main.	Mainly
MB	Master Bedroom
MBMB	Majlis Perbandaran Melaka Bersejarah
MIG	Middle Income Group
Mod.	Moderately
MPHTJ	Majlis Perbandaran Hang Tuah Jaya
NAA	Not at all
PBT	<i>Pihak Berkuasa Tempatan</i>
Perc.	Perception
Perso.	Personality
Price	House price
SPSS	Statistical Package for the Social Sciences
SS	Social Status

TA	Taman Aman
TAP	Taman Alai Perdana
TBR	Taman Bukit Rambai
TCJ	Taman Cheng Jaya
TDD	Taman Desa Duyong
TM	Taman Merbok
TPRI	Taman Paya Rumput Indah
TSC	Taman Seri Cempaka
TSJ	Taman Seri Jati
TSU	Taman Sungai Udang
U	Uncertain
UBBL 1984	Uniform Building By-Laws 1984
Vehicle	Number of vehicle
VL	Very little
Years.	Number of years residing

LIST OF PUBLICATIONS

Diana Mohamad and Nurdalila Saji (2012). PTS and the Built Environment in George Town, Penang. *Developing Country Studies*, 2(11/12), 214-219.

Nurdalila Saji (2012). A Review of Malaysian Terraced House design and the Tendency of Changing. *Journal of Sustainable Development*, 5(5), 140-149. <http://dx.doi.org/10.5539/jsd.v5n5p140>

Nurdalila Saji and Fuziah Ibrahim (2013). The Tendency of Spatial Layout Changes in Design of Terraced Houses in Melaka Tengah, Malaysia. *Proceedings of the Fourth Asian Conference on the Social Sciences (ACSS)* June 6-9 2013, (Pp. 239-257). Osaka, Japan.

Nurdalila Saji and Fuziah Ibrahim (2013). Trends of Terraced House Modification: A Case Study in Taman Sri Cempaka, Melaka Tengah. *International Workshop on Livable Cities and International Conference on Sustainable Architecture and Urban Design 2013. (IWLC 2013)* Oct. 2-5, 2013.

**FAKTOR-FAKTOR YANG MEMPENGARUHI MODIFIKASI
REKABENTUK RUMAH TERES SATU TINGKAT DI MELAKA TENGAH**

ABSTRAK

Modifikasi rumah teres telah menjadi '*trend*' sejak kebelakangan ini. Ia telah dibuat secara berleluasa samada dengan memperoleh kebenaran bertulis dari Pihak Berkuasa Tempatan atau sebaliknya. Bagaimanapun, langkah yang betul tidak diambil untuk mengatasi masalah ini kerana modifikasi rumah teres telah menjadi satu keperluan kepada penghuni untuk menampung pertambahan bilangan isi rumah. Oleh itu, satu kajian telah dibuat dalam mengkaji tahap mengubahsuai dan persepsi isi rumah dari segi personaliti penghuni, citarasa, minat, cara hidup, nilai serta status sosial. Tapak kajian yang dipilih adalah di kawasan Melaka Tengah. Melaka Tengah dipilih kerana kurangnya kajian ke atas modifikasi rumah teres dilakukan di kawasan tersebut sedangkan ia adalah kawasan asal rumah teres di Malaysia. Teknik pengumpulan data termasuk observasi, kajian soal selidik serta temubual tidak berstruktur. Kawasan kajian termasuklah Taman Sungai Udang, Taman Seri Jati, Taman Seri Cempaka, Taman Paya Rumput Indah, Taman Merbok, Taman Desa Duyung, Taman Cheng Jaya, Taman Bukit Rambai, Taman Aman serta Taman Alai Perdana. Teknik analisis data adalah menggunakan analisis deskriptif statistik untuk mendapatkan profil demografi responden. Analisis Regresi digunakan untuk menganalisis 'ruang' serta dan 'sebab-sebab modifikasi' untuk menjustifikasikan pembolehubah bersandar iaitu 'persepsi hasil modifikasi'. Ujian Chi Square digunakan untuk menentukan hubungan antara pembolehubah. Hasil dari kajian menunjukkan ruang yang paling banyak diubahsuai adalah dapur, ruang meletak kenderaan, bilik tidur utama, bilik mandi 1, halaman hadapan dan bilik tidur 1.

Terdapat hubungkait di antara sebab-sebab mengubahsuai dengan profil responden iaitu 'bilangan isi rumah', 'pendapatan isi rumah', 'bilangan anak', 'bilangan tahun menduduki', 'bilangan bilik tidur', 'bilangan kenderaan' dan 'status pelan lantai rumah'.

**FACTORS INFLUENCING THE MODIFICATION OF THE SINGLE
STOREY TERRACED HOUSE DESIGN IN MELAKA TENGAH**

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 resident's personality, tastes, interest, lifestyle, values and social status. The site of study is selected in Melaka Tengah. 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 Indah, 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. Regression Analysis is used to analyse 'space' and 'reasons for modification' to justify the dependent variable which is the 'perception of modification outcome'. Chi square tests are used to establish the relationships between the variables. Result from the study shows that the most modified space includes kitchen, car porch, master bedroom, bathroom 1, front lawn and bedroom 1. There is a relationship between reasons for modification among aspects of 'number of household', 'household income', 'number of children', 'number of years residing', 'number of bedrooms', 'number of vehicles' and 'floor plan status.'

CHAPTER 1: INTRODUCTION

1.1 Introduction

This research presents the factors influencing the modification of the single storey terraced house design mainly in Melaka Tengah. It focuses on reasons behind terraced housing modification and the changes that had been made to its design and space. Chapter 1 contains the background of research, statement of problem, research questions, research objectives, significance of study, conceptual framework, scope of research, limitation of research, research structure, research design and organization of chapters.

1.2 Background of Research

In general, either than providing living space for the family, house is also regarded as a valuable property (Rukwaro and Olima 2003). On the other hand, Kopec identifies home as a place that offers an understanding of warmth and comfort, safety and security towards the dwellers. Moreover he stated that, the home offers a place for individual thoughts and a depiction of uniqueness of the owners (Kopec, 2006).

Terraced houses are a column of indistinguishable or mirror-image houses that share side walls. The end of every row is called end terrace, end house or corner house which is normally bigger than the intermediate lot. It is common for a terraced house to have open spaces at the front and back region of the house. The construction of the terraced house must comply with regulations provided by the Fire Services

Department. According to the UBBL regulations, each row shall not exceed 130 feet and may consist of 10 to 12 units depending on the width of the house (UBBL, 2013).

Terraced houses were incorporated from the British terraced house design and it is better-known as “row houses” in some countries (Ahmad Hariza, Zaiton, Sharifah Norazizan and Nurizan, 2006). The design of the terraced house is somewhat confined and profound with an arrangement and design of openings in the front and back region of the house (Chandler et al., 2005). According to Ahmad Hariza and Zaiton (2008), by using chain linked fence or brick perimeter wall, the terraced house’s boundaries are plainly set and the housing itself comprised of rectangular housing lot in rows (Ahmad Hariza and Zaiton, 2008). The disadvantages of mass housing is that it is designed in many instances, with average expertise in mind for the regular needs of today, without thinking about the future changes of the occupants (Baldwin and Tomita, 2007). Oftentimes the housing design is insensitive to the inhabitant and short of social and cultural attentiveness (Parva and Dola, 2007; Ahmad Hariza and Zaiton, 2010).

Adjustment of desire or adjustment of the present house via modification or relocation is a result of conflict between the present house and the occupant’s needs, preference and desire (Baum and Hassan, 1999; Mohammad, Mansor and Yong Razidah, 2010). 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, 2000). Households can react to residential dissatisfaction in three basic ways: adaptation, transformation or mobility (Aduwo, Ibem and Opoko, 2013).

In assent with Maslow's model of hierarchy of needs, society in particular has progressed to a higher level of needs commonly in a modern and developing country like Malaysia (Masran, 2006). Ozaki (2002) noticed that displeasure is caused by irregularities of house design and user's values and lifestyle. This is a gap that Tipple (2000) believe is known as "*housing stress*". Bell et al. (2001) discovers that contend response is used when specific attributes become insufficient.

Masran (2006) established that in order to add extra space to satisfy the occupant's needs such as adding one or two bedrooms, homeowners opt on legal and permissible extensions. Occupants used their creativity to modify extant space for other usage, some even converted a small entrance to utilize the minimum space (Masran et. al., 2012).

Occupants tend to have certain purpose in their lives to accomplish and attain certain aesthetic taste that displays their image at higher level of hierarchy which is expressed through the choices they made and the aesthetics displayed of their house (Masran, 2012). There is a very minimal involvement of the homeowners or buyers in the design stage on current method of house purchase causing homeowners to modify their houses at a particular stage to fulfil their higher level of needs (Masran et al, 2012).

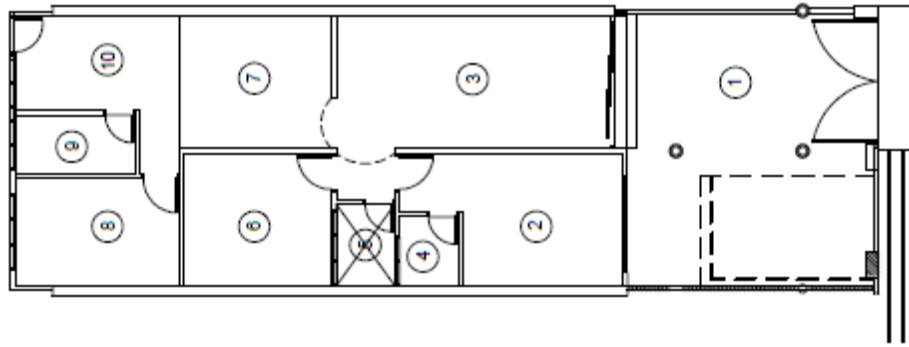
Masran (2012) agrees that every decision on shaping the built environment is currently designated to the professional designers. Thus, some houses are built with excessive design which is not related to the prospect of the occupant just to appear attractive (Rukwaro and Olima, 2003). In order to obtain a desirable living environment, homeowners did their best in their home modification which idea is aptly supported by Masran, (2010) suggests that people are free to express themselves thus revealing who they are in public.

Researches by Noor Sharipah (1991), Husna and Nurizan (1987), and by Chamhuri and Mohd Fauzi (2003) on low-cost flats in Kuala Lumpur find significant dissatisfaction levels with the houses of the occupants. All of them suggest that the dominating factors causing the dissatisfaction include lack of space for family members (overcrowding) due to insufficient number of bedrooms, and inappropriate room sizes and minimal layout of the houses. Sadly, this situation remains unchanged for decades.

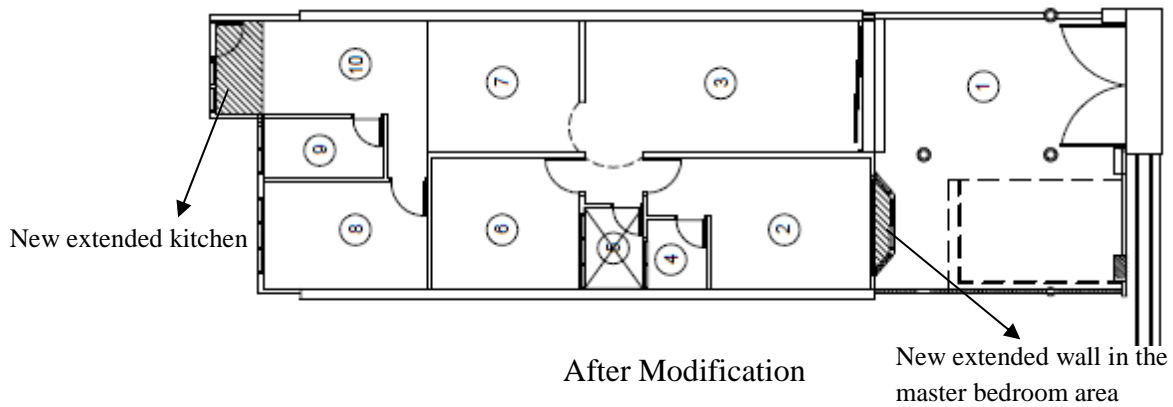
There are two different types of housing modification that are essential which relates to (1) spatial and technical function and (2) aesthetic design (Akalin et al., 2009). With modification, there is a perception of control towards the environment to the occupants (Kinney et al., 1985; Wells, 2000). Moreover, the inadequacy of the home can be improvised with modification (Mahmud, 2007). In order to achieve satisfaction while living in mass housing, having an adaptable house is an essential spatial figure (Altas and Ozsoy, 1998; Schmidt et al, 2010). As Croxton (2003, p.147) points out, *“If a building doesn’t support change and reuse, you have only an illusion of sustainability.”* Modification can fulfil personal needs which were

neglected in the initial design (Giullani and Bucchignani 2000). Therefore, variety of residents and their needs can be supported if flexibility and adaptability in design is treated substantially (Friedman 2002). Any lifestyle changes of the occupants over different phases of their life should be manageable with modification (Baldwin and Tomita 2007).

In cases where the existing houses have not fulfilled the important needs of the family, housing modification is deemed beyond expressing personal identity (Zaiton and Ahmad Hariza, 2012). In Malaysia, due to high price of houses in the city, modifications were done substantially to equip the house with occupant's needs especially when moving to a new house is not an option (Zaiton and Ahmad Hariza 2012). As long as housing modification can be afforded, adaptability is vital (Zaiton and Ahmad Hariza 2012). Until today, terraced house modification has become common and fit to be part of the Malaysian culture (Department of Housing, 2004 in Zaiton and Ahmad Hariza, 2012). Furthermore, until housing modification can be sustained, it is established that some features of the Malay culture were lost or altered in the course of behavioural adaptation in low cost terraced housing (Zaiton and Ahmad Hariza, 2006).

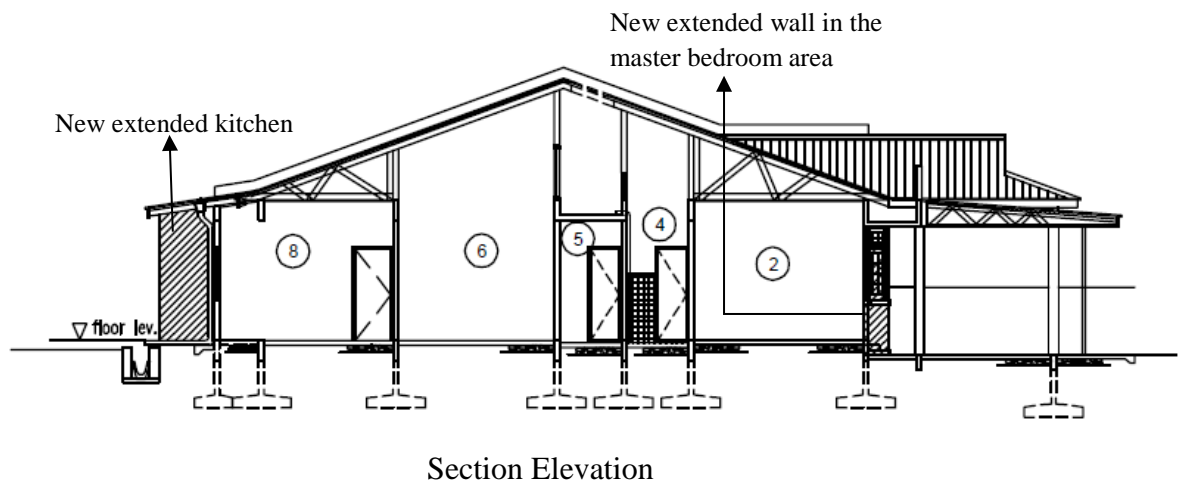


Before Modification



After Modification

Figure 1.1: An example of a typical modification of a single storey terrace house in Malaysia. It mainly involves the front facade and the kitchen area.



Section Elevation

Figure 1.2: The section elevation shows the extended kitchen and the extended wall in front.

Decorating or beautifying, altering, modifying and adapting are normal behaviour of human activity (Oulasvirta and Blom, 2008). Any modification or addition to the façade by the residents is considered as a personalization. This includes changes in the front lawn or the back yard or garage (Marcus and Sarkissian, 1986). Some homeowners modify their house for profit or merely make their home modish and beautiful (Abbott et al., 2003). Other than looking irreversible and outward, home modification are often contradictory with the buildings integration and incompatible with the façade treatments (Giullani and Bucchignani, 2000).

It seems that buyers of the mass housing do not have much choice but to accept what is delivered to them by the housing developers. It can be accepted that design styles of houses have changed tremendously for several decades, but unfortunately the changes are only made to the facades, finishes, spatial arrangements, and aesthetical styles, and therefore the choice is only related to these aspects. Unsuitable design problems and the needs and expectations of the users remain unresolved. Many put the blame on the dominating financial concern among the private sectors that force architects to concentrate primarily on maximising the number of units or houses on site and only enhancing facades for marketing purposes (Ahmad Bashri, 2000). An adverse consequence, they stressed, is the poor design articulation to meet user needs (Madigan and Munro 1991; Ahmad Bashri 2000). The Housing Development Regulation – a mechanism to control and regulate the rapid growth of private housing development in Malaysia - as Ahmad Bashri (2000) argues covers the economic and other financial aspects without adequate reference to address design and environmental consideration.

1.3 Statement of Problem

Malaysia has undergone a rapid construction of terraced housing developments all over the country for over 40 years. In order to meet the ever increasing demand for housing, the government and private developers have been constructing this type of housing as a mass housing strategy. The terraced house was adopted from the British and also known as “row houses” in some other countries (Ahmad Hariza, Zaiton, Sharifah Norazizan and Nurizan, 2006). The terraced house features are repetitive and monotonous and the boundaries are clearly defined by using fences or brick wall (Ahmad Hariza and Zaiton, 2008).

Some authors suggest that the prevalent house renovation practice in this country is due to the unsuitable and inappropriate finished houses delivered by the developers in mass housing. Researches by Noor Sharipah (1991), Husna and Nurizan (1987), and by Chamhuri and Mohd Fauzi (2003) on low-cost flats in Kuala Lumpur find significant dissatisfaction levels with the houses of the occupants. All of them suggest that the dominating factors causing the dissatisfaction include lack of space for family members (overcrowding) due to insufficient number of bedrooms, and inappropriate room sizes and intimal layout of the houses. Sadly, this situation remains unchanged for decades. In their research, Tan (1979) and Leong (1979) report that house designs in the mass housing schemes fail to address the needs of the households and, the design of the houses was inadequate and inappropriate to meet the cultural and religious needs of the occupants. These problems have forced the households to alter their houses in order to accommodate their needs. Changes and modification without proper control could result in chaotic facades (Marcus and

Sarkissian, 1986), contradictory with the building's unity and incompatible with the façade treatments (Giullani and Bucchignani, 2000) and often irreversible as much money have been invested into the transformation (Parva and Dola, 2010).

House modifications were carried out for various reasons. Some modifications are made to increase the property value, and some to beautify the façade (Salehaton, Erdayu Os'hara, Hazlina and Ibrahim, 2012). Not only these improvements increase their satisfaction, but it also creates attachment (Kinney, Stephens, McNeer and Murphy, 1985). According to Rapoport, (1969 and 1981); Nasar, (1989); Zaiton and Ahmad Hariza, (2012); Gosling et al., (2002); Jansen, (2013), the reason behind modification which is widely accepted is that housing modification is an expression of a resident's personality, tastes, interest, lifestyle, values and social status. Several studies also revealed that it is an important process for residents to create their ideal home (Fernandez, 2007; Gifford, 2008; Russell, Potangaroa, and Feng, 2008). Mahmud (2007) pointed out that homeowners modify the homes in order to increase congruence with their home environment. In their study on house modification, Erdayu Os'hara, Esmawee and Masran (2010) identified modification works were carried out using several method which are increasing the size (addition or extension), reduction of size (removal or division) or relocation of spaces. An increase in dwelling size has been a common practice and is the most preferred method of modification (Erdayu Os'hara, Esmawee, and Masran, 2010). By enlarging the house, the quality of living environment will be greatly improved (Tipple, 1996). Modification provides better privacy level for the homeowners and improves the functional aspect of the house (Erdayu Os'hara, Esmawee and Masran, 2012b).

Despite advancement in certain design aspects including variations in spatial and facade design, the houses are still far from being able to satisfy the users. The houses are often designed as “perfect” settings, as if they do not require any further modifications. As a marketing strategy, developers associate the design with their architectural slogans alongside with the glossy pictures such as “homes for tomorrow”. Like other architectural utopian ideas, the slogans remain as commercial advertising campaigns which are seldom neither achievable nor achievable at all. A standardized house design is always a common outcome of the formal delivery system that is frequently noted only in terms of cost (Ahmad Bashri, 2000). In Malaysia, the various socio-cultural needs of the people are neglected whereby the multi-ethnic characters of Malaysian culture are not reflected in the design (Ahmad Bashri, 2000). If housing provisions are still undertaken mainly by the private developers as in the case of this country (Johnstone, 1980; Chamhuri and Mohd Fauzi, 2003), the problems of design unsuitability would never end. Therefore renovation for modification is inevitable. It is thus apparent that modification seems to occur despite countless designs treatments and differentiation between residential neighbourhoods. This study aims at understanding these trends to this modification process.

It should be highlighted that architects and engineers would have sworn vide a statement on their drawings and documentation that their designs comply with the UBBL and they would be accountable and responsible for the designs submitted to the Local Authorities. The duties to certify the stages of the development are enforced by law vide the UBBL and other related Acts. Construction professionals should be aware that a breach of this duty would expose them to claims for fraud due

to wrongful certification or economic loss arising out of the natural consequence of the breach.

The Uniform Building By-Laws, 1984 (UBBL) was established out the need for a standardised set of building regulations for the country. However, despite the federal government gazetting the UBBL in 1985, the reality is that until today the use and interpretation of the UBBL are anything but uniformed. The enforcement of UBBL is governed by the states and hence gazetted separately with slightly different versions for each of the states.

As the UBBL is a state matter, many Local Authorities and Technical Departments have their own readings and interpretation of the UBBL. The differences in the translations between the English and *Bahasa Melayu* versions also added to the confusion (Badrul Hisham, 2011). Hence, there is a need to re-look into the intents of the UBBL and persuade all state governments to agree to a “Local Authorities’ Endorsed” standardised explanatory notes. To that effect, the fire department had produced two definitive books on their interpretation of the fire protection system’s requirements which had become very useful references for designers (Badrul Hisham, 2011).

1.4 Research Questions

Research questions are developed to coincide with the research objectives in order to identify trends and provide significance of the study.

- 1) What kind of spatial changes being made on the terraced house after the occupancy?
- 2) How is modification affecting households?
 - i) How is modification affecting households in terms of Personality?
 - ii) How is modification affecting households in terms of Tastes?
 - iii) How is modification affecting households in terms of Interest?
 - iv) How is modification affecting households in terms of Lifestyle?
 - v) How is modification affecting households in terms of Values?
 - vi) How is modification affecting households in terms of Social Status?
- 3) How are the reasons for modification influence the terraced house changes in terms of the modification outcome of space?

1.5 Research Objectives

The general objectives of this study are to examine the needs and expectation of residents on the tendency of housing modification and to study the relationship between the needs for space and housing modification. The specific objectives are:

- 1) To delineate the modification outcome and spatial changes of terraced houses in Melaka Tengah.
- 2) To specify factors influencing the modification.
- 3) To examine the relationship between the modification outcome and the factors influencing the modification of terraced houses.

1.6 Significance of Study

This section will provide brief description on the various significances of the study. This study is important because it will provide the indispensable facts about the existing situation of terraced house modification in Melaka Tengah, including the residents' preference and persons involved in design and construction of the house as a result in excessive modification in several areas in Melaka Tengah.

This study will serve as the basis for future plans of action by the local authorities with regard to the necessary actions for the excessive modification and to provide information on what the homeowners can and cannot do in modification. Among the persons who are directly or indirectly involved are the following:

- i) This study will not only benefit the homeowners but also the designers as it will create an element of awareness about the importance of providing the information on rules and regulations of terraced house modification to the residents and homeowners.

- ii) The local authorities of Majlis Perbandaran Melaka Tengah (MBMB), including the staff and construction workers will have a better understanding of the limitation; knowledge of the proper guidelines will enable them to know the area of difficulty and strength thereby guiding them in reconstructing their designs to suit the peoples' needs.

Furthermore, this study will serve as a theoretical model for future studies of the same nature if ever the existing problem has penetrated in this case will exist in the future. Future researchers will benefit from this study, and it will provide them the facts needed to compare their study during their respective time and usability.

1.7 Conceptual Framework

The conceptual framework (Figure 1.3) consists of this research process in chronological order. The input of this research is to study the reasons behind terraced house modification which then divided into six independent variables which are Personality, Tastes, Interest, Lifestyle, Values and Social Status derived from Rapoport 1969; Nasar 1989; Gosling et al. (2002); Jansen (2013). The independent variables cause changes to the terraced houses which focuses on changes of space.

These changes are then categorized into several spaces in the terraced houses which are identified as dependent variables.

The list of space used is based on Erdayu Os'hara, Esmawee and Masran's (2010) study on housing modification in Klang Valley area. In this study, the common space in a terraced house includes; Master bedroom, Bedrooms, Kitchen, Living room, Dining area, Bathrooms, Car porch, Family area, Wet kitchen, Front lawn and Backyard. The distribution of space is summarised in table 1.2 on each of the housing area included for this study. The theory of housing adjustment is used in this section of the study where the researcher determines how families are housed, the consequences of housing for families, and the decisions families make.

The quantitative tools for this study include observation, questionnaire surveys and SPSS data analysis which are explained in the methodology chapter of this thesis. Finally, general perceptions are derived from questionnaire surveys as Output of this study. General perceptions or perceptions of modification outcome are made according to Mahmud's (2007) research on 'Personalization as a Means of Achieving Person-Environment Congruence in Malaysian Housing.' The perception of modification outcome is adapted from the theory of housing satisfaction by which people compare the housing they would like to have with their current housing situation.

Conceptual framework

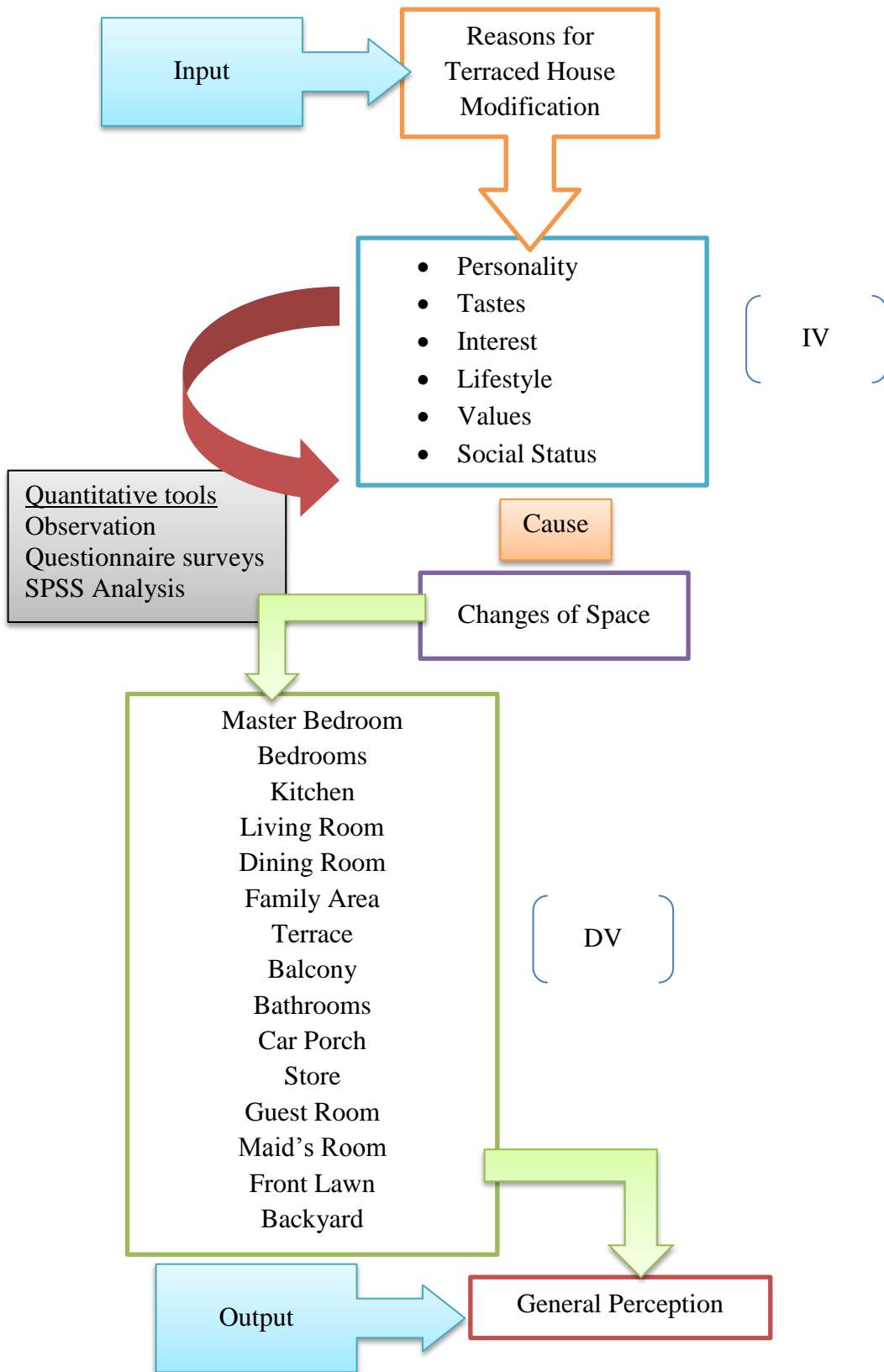


Figure 1.3 - Conceptual framework

1.8 Scope of Study

The scope of this study includes:

1. This study examined changes that have been made on terrace houses in Melaka, Malaysia. The sites for the study are towns in Peninsular Malaysia namely Melaka. The reasons for choosing the towns are; because of the population size, also Melaka; where the earliest row houses were built in Melaka during the Dutch occupation in 17th Century (Sumita, 2009). The community of the residents in Melaka is still synonymous with the Malay culture. Land demarcation is still being practised based on kinship foundation, negotiation and responsibility. However, this spirit will be diminished slowly especially when the process of urbanization starts. The values of a house compound as a medium for a strong family and community bondage will be lost when the residents start to modify their houses (Anisa, Noorizan and Nordin, 2012). Furthermore, after several visits to Majlis Perbandaran Melaka Tengah city council, the author could not obtain any guidelines on housing modification since there is no provision of it. The authority of MBMB includes areas in Mukim Bukit Katil, Tangga Batu and Bandar Melaka. The areas are chosen under the management of MBMB – Majlis Bandaraya Melaka Bersejarah. The Melaka Tengah District and Land Office is one of the departments responsible for the management of Malacca affairs of the land other than the Jasin District and Land Office and the Office of Alor Gajah District and Land. District, covering an area of 314,000 hectares is the main focus of management in developing areas beyond the interests of landowners and the state government. This study emphasizes more towards

medium cost housing areas. The middle income households are identified based on both economic and cultural consideration. The pressing issue today is housing the middle-income sector which by some estimates makes up half of the country's population. Middle-income housing is now selling at prices which exceed the financial ability of members of this group. This is why the need to study this income group as to find out how they adapt with the situation. Furthermore, this study focuses on single storey terraced housing since any modification would be visible especially when a single storey house is converted into a double storey. The gross built up area is typically around 900 to 1000 square feet (83.6m² to 92.9m²) (Farah, 2010).

2. The study concentrated on the background, profile, perception and household input towards housing modification and the impact during the construction or afterwards. This study also includes reasons for modifications, changes of space and general perception of the modification outcomes. The tendency of modification in this study is expected to realize the needs and expectation of the residents. The physical and emotional functioning of the household is measured in terms of the value of modern and current terraced house design. Hence, the study uses questionnaire surveys to determine household preferences and their houses' functional efficiency as independent variables and their tendency of house modification as dependent variable. Interviews and surveys are also applied to the designers involved in the housing industries such as architects and contractors. The unit of analysis is the terraced house resident from various high population areas. Not only house modification takes effect on old houses, it also takes effect on new constructed houses. However, duration of living has the

possibility of family expansion and they might have sense of attachment to their places. Place attachment study reveals that specific place uncovers memories of childhood and enhances personal uniqueness through long term connection and experiences of a place and which is why people cherished the particular place so much. (O'Brien, 2000; Mazlina, 2007). This contributes to the reasons why the residents choose to stay rather than moving to a bigger house even though their household unit has increased. To achieve the objective which is to specify the factors influencing modifications, the areas where most houses are modified are chosen. Furthermore, the local residents have been residing there for some time to really know well their places and to experience the spaces inside the house.

The following shows the list of housing areas included in this study with the respected number of respondents. The calculations are simplified using Raosoft Sample Size Calculator which is attached in the Appendix A section of this thesis.

The location map is shown as follows.

Table 1.1 – List of housing areas and number of respondents

No.	Housing Area	Number of Respondents (Houses surveyed)	Number of Population (Modified Houses)
1	Taman Alai Perdana	46	51
2	Taman Aman	44	49
3	Taman Bukit Rambai	54	62
4	Taman Cheng Jaya	49	56
5	Taman Desa Duyong	57	66
6	Taman Merbok	68	82
7	Taman Paya Rumput Indah	58	67
8	Taman Seri Cempaka	46	51
9	Taman Seri Jati	51	58
10	Taman Sg. Udang	38	41
Total		511	583

Table 1.2 - Distribution of space within the house

Space / Housing area	TAP	TA	TBR	TCJ	TDD	TM	TPRI	TSC	TSJ	TSU
Front Lawn	x	x	x	x	x	x	x	x	x	x
Car Porch	x	x	x	x	x	x	x	x	x	x
Master Bedroom	x	x	x	x	x	x	x	x	x	x
Bath. 1	x	x	x	x	x	x	x	x	x	x
Living area	x	x	x	x	x	x	x	x	x	x
Bed. 1	x	x	x	x	x	x	x	x	x	x
Bed. 2	x	x	x	x	x	x	x	x	x	x
Dining area	x	x	x	x	x	x	x	x	x	x
Kitchen	x	x	x	x	x	x	x	x	x	x
Wet Kitchen		x								
Bath. 2	x	x	x	x	x	x	x	x	x	x
Family area					x	x	x	x		
Backyard			x	x	x		x	x		x

The table above shows the space within the house. The mark (x) indicates the space exists within the house of the housing area. The layout plans for all the housing areas are attached in Appendix B. The layout plans includes all the spaces that has been modified mainly and moderately according to the Likert scale in the questionnaire. The result from this study is explained in Chapter 4 – Analysis and Findings.

1.8.1 Taman Alai Perdana

Table 1.3 – Taman Alai Perdana housing area

Plot Size	20' × 60'
Allocation Block	Alai - Telok Mas
Total Area	563,058.86m ²
Number of Population (Modified houses)	51
Number of Respondents	46

According to Table 1.3, Taman Alai Perdana site of study consists of medium cost terraced house with the plot size of 20' × 60'. The allocation block according to Local Plan is Alai – Telok Mas. Taman Alai Perdana total area is 563,058.86m² with the number of modified houses is 51. After using the sample size calculator, the appropriate number of respondents needed for this housing area is 46.



Figure 1.4 – Taman Alai Perdana housing area



Figure 1.5 - Taman Alai Perdana Location Map. Source: Google Map, 2014

1.8.2 Taman Aman

Table 1.4 – Taman Aman housing area

Plot Size	20' × 70'
Allocation Block	Padang Temu
Total Area	117,365.78m ²
Number of Population (Modified houses)	49
Number of Respondents	44

According to Table 1.4, Taman Aman site of study consists of medium cost terraced house with the plot size of 20' × 70'. The allocation block according to Local Plan is Padang Temu. Taman Aman total area is 117,365.78m² with the number of modified houses is 49. After using the sample size calculator, the appropriate number of respondents needed for this housing area is 44.



Figure 1.6 – Taman Aman housing area

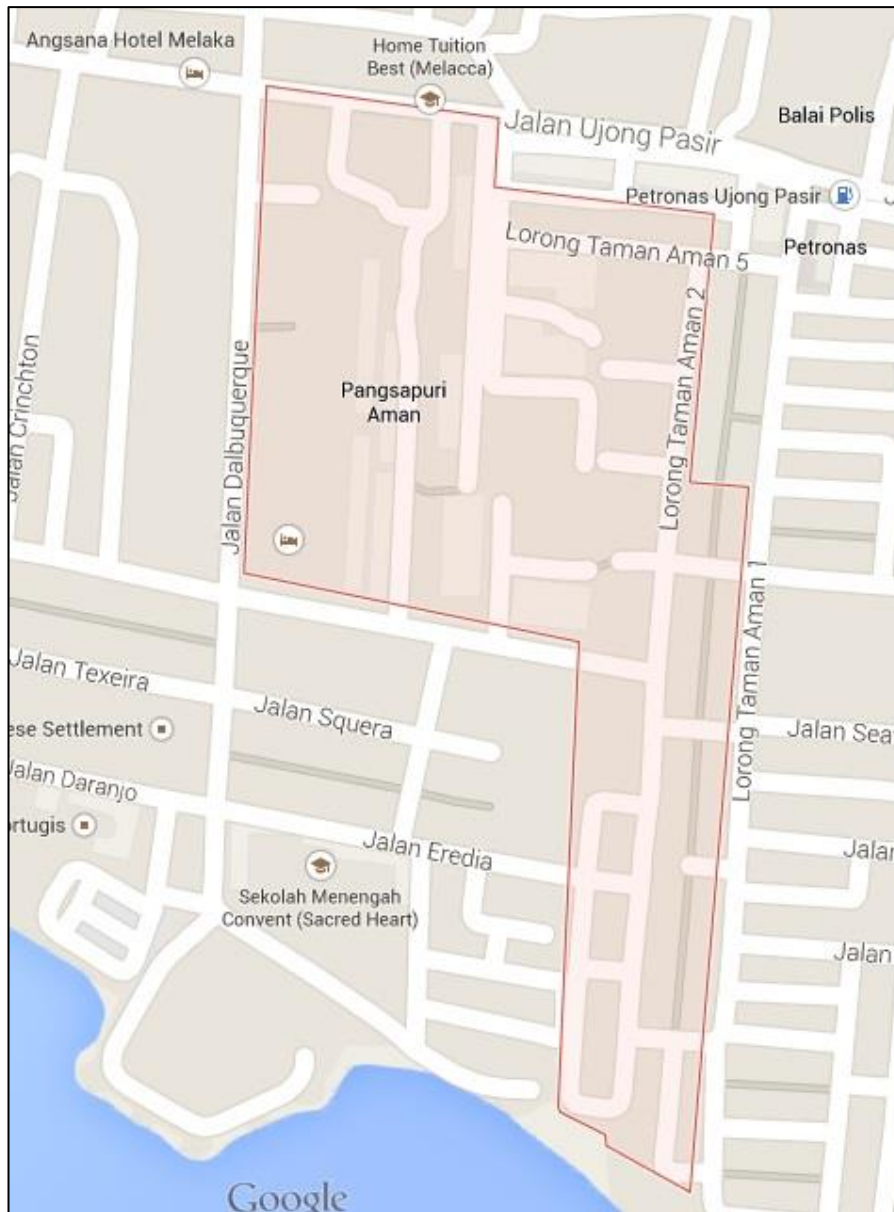


Figure 1.7 - Taman Aman Location Map. Source: Google Map, 2014

1.8.3 Taman Bukit Rambai

Table 1.5 – Taman Bukit Rambai housing area

Plot Size	20' × 70'
Allocation Block	Klebang
Total Area	682,646.27m ²
Number of Population (Modified houses)	62
Number of Respondents	54

According to Table 1.5, Taman Bukit Rambai site of study consists of medium cost terraced house with the plot size of 20' × 70'. The allocation block according to Local Plan is Klebang. Taman Bukit Rambai total area is 682,646.27m² with the number of modified houses is 62. After using the sample size calculator, the appropriate number of respondents needed for this housing area is 54.



Figure 1.8 – Taman Bukit Rambai housing area