A STUDY ON SPACE DESIGN CRITERIA FOR AFFORDABLE HOUSING IN KLANG VALLEY, MALAYSIA

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ABSTRACT

Quality housing is an essential need of the people as the government consistently ensure the accessibility to quality affordable housing. The current issue encountered mismatch of demand and supply of affordable housing for medium income group with an affordable housing price. Development of space design standard of affordable housing throughout Malaysia housing plan in Kuala Lumpur provides an opportunity to study the evolution and satisfaction of occupants related to medium-cost housing. As the constant provision of medium-cost housing, the issue on the adequacy of space design standard to satisfy the needs of occupants arises. This paper intends to carry out the study of space design criteria of affordable housing in Klang Valley. Malaysia housing policy is reviewed to identify the development of affordable housing for the implementation of housing programs undertaken by private and government agency. Provision of affordable housing schemes in Malaysia is discussed whether it achieves the level of affordability among medium income group. The satisfaction of occupants towards the housing space criteria is concerned by conducting a quantitative survey on Lestari Apartment, Lumayan Apartment, Alam Prima Apartment and PR1MA @ Precinct 11. Moreover, an evaluation on the compliancy of space standard was conducted to examine percentage of space increment from UBBL. The result shows that the overall satisfaction level of space provision stated level of "slightly satisfied" whereas the top ranked space criteria are living room and bedroom size while the least satisfied space is the storage area. Through the analysis, it shows that adequacy of space criteria is important to achieve the satisfaction level of occupants. Finally, this paper provides recommendations to the standardized and implement latest space standard for medium cost housing. This is to ensure consistent revision on housing policies and standards to meet the current quality housing needs.
Keywords: Space Criteria, Space Standard, Affordable Housing Development, Medium-Cost Housing

1. INTRODUCTION

City Hall Kuala Lumpur (City Hall Kuala Lumpur, 2016) vision is to be a world class city by the year of 2020. In order to achieve the world class city, the local authority takes action and with the Structure Planning 2020 revised to improve the citizen quality of living, working environment and business environment (City Hall Kuala Lumpur, 2016). The quality of life consists of the fulfilment of the needs of human such as the satisfactory of living in clean environment. This much related to the income of citizen in Kuala Lumpur and the sufficient of facilities provide by the City.

Based on DBKL (2016), the household income that are less than RM2,000 consist of 32.7% compare to household income between RM2,000 to RM3,000; RM3,000 to RM4,000 and more than RM4,000 stated percentage of 20.5%, 14.3% and 32.5% respectively. This shows that household income with less than RM2,000 are the highest percentage. Due to the different category of the household income level in Kuala Lumpur, the government provided 3 housing categories which is the low-cost, medium-cost and the high-cost housing.

As the constant provision of medium-cost housing, the issue on the adequacy of space design standard to satisfy the needs of occupants arises. The space standard and design criteria of medium-cost housing are inadequate to fulfil the needs of carry out household routine and accommodation (Mahmud, Ahmad, & Megat Abdullah, 2012).

The inadequate space design included storage room to store household items they own. This issue arises where there is no specific minimum space standard for storage room and guideline of medium-cost housing construction in policy. Besides that, there is insufficient space design after placement of furniture restricted occupant to carry out household activities. Other issue arises due to insufficient space standard is privacy of occupant to carry out activity at specific area. The house owner in building is having a restricted space to accommodate higher number of people in such space. The space standard of medium-cost housing much related to the evolution of space standard for low-cost housing where it is derived and upgraded size from lower space standard.

Moreover, Malaysian citizen who started to work in the industry are desirable to own and buy a new house. It is the issue that the growth of housing price and shortage of medium income housing are greatly affects the needs and affordability of Malaysian people afford to buy affordable housing.

2. AFFORDABLE HOUSING DEFINITION

The affordable housing is defined as the housing which is legally restricted for the use of individual or household who meet the requirement of income stated by government (Davidson & Malloy, 2016). The development of affordable housing scheme recognises the needs and requirement of households where their household income does not sufficient for them to own a house in the market without any assistance from the government (Bakar, 2013; Milligan, Phibbs, Gurran, & Fagan, 2007; Sliogeris, Crabtree, Phibbs, & Johnston Professor Phillip, 2012) . Thus, the government took the initiative to provide and develop affordable housing for the lower income group. The definition of affordable housing is subjected to complex matter where it is defined as the household whose income should afford to pay for housing not more than 30% including utilities (Baqutaya, Ariffin, & Raji, 2016).
The meaning of affordable housing refers to the housing constructed in the market to meet the demand of household where the household income is insufficient to access housing without assistance (Aziz, Hanif, & Singaravello, 2011). Affordable housing in Malaysia is the provision of housing which based on the requirement introduced by government to ensure social economic stability and promote national development. Malaysia government introduce the affordable housing scheme to provide Malaysian people to obtain their first house with affordable price.

The guideline implemented by the federal government for low-cost housing defined as the housing unit ceiling price stated RM25,000 or less with space standard of $52m^2$ to $60m^2$ for low income group of monthly salary less than RM750 (UN-HABITAT, 2008). The Construction Industry Standard 2 (Construction Industry Standard 2, 1998) in 1998 define low-cost housing held by private or public sectors who provide housing with the price not more than RM25,000 a unit for low income group or the housing price fixed by the government from time to time. In year 2005, the low medium-cost housing defined by Construction Industry Development Board (CIDB) where the housing price for each unit of low medium-cost housing not more than RM70,000 or the price fixed by the government from time to time.

Malaysia government implemented various affordable housing schemes with the definition as below:

NO	DEFINITION	SOURCE
1.	Affordable housing is defined as a housing price stated RM300,000 and below where the affordable housing consists of three main categories which is low-cost housing, low-medium-cost housing and medium-cost housing with household income less than RM5,000.	**National Housing Department, Ministry of Urban Wellbeing, Housing Malaysia and Local Government**
2.	Affordable housing is defined as housing price introduced within price RM100,000 and RM400,000 for household income between RM2,500 to RM7,500 per month.	**Perumahan Rakyat 1Malaysia (PR1MA) or 1Malaysia People's Housing Programme**
3.	Affordable housing defined as housing price introduced within RM100,000 and RM300,000. The requirement for ownership are applicants must less than 35 of age and the individual income is not more than RM5,000 or the household income does not exceed RM10,000.	**Syarikat Perumahan Negara Berhad (SPNB)**
4.	Affordable housing defined as housing price introduced less than RM300,000 which having house type of 1 to 3 bedroom and low-cost housing with 3 bedrooms. The required house hold income per month must be less than RM10,000.	**Rumah Mampu Milik Wilayah Persekutuan (RUMAWIP)**

3.0 Evolution of Affordable Housing in Kuala Lumpur, Malaysia

People's Housing Program (PPR) implement by the government to relocated the squatters to DBKL low-cost housing which meets the requirement for low income group. Based on Ministry of Urban Wellbeing, housing and local government 2015, total 4109 units of low-cost housing is completed, 6243 units is under construction and 16,473 units is under planning in Malaysia.

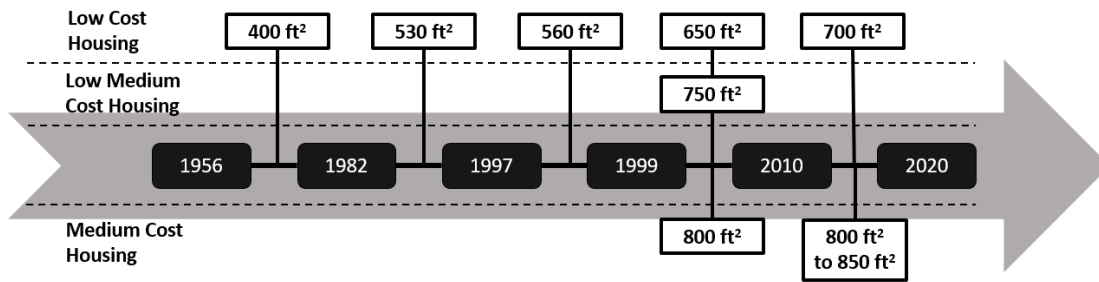**Table 1: Evolution of affordable low-cost housing space standard**

No.	Year	Space standard (ft^2)	Ceiling Price per Unit (RM)	Space criteria
1.	1956 – 1981	400	RM25,000	• 1 bedrooms • 1 bathrooms
2.	1982 – 1996	530		• 2 bedrooms • 1 bathroom
3.	1997 – 1998	560		• 2 bedrooms • 1 bathrooms
4.	1999 - 2009	650	RM35,000	• 3 bedrooms • 2 bathrooms JPN Standard Plan, 2000 • Bedroom: 260 ft^2 • Bathroom & kitchen: 100 ft^2 • Living room: 260 ft^2 • Yard: 31 ft^2
5.	2010 – 2020	700		• 3 bedrooms • 2 bathrooms

Source: City Hall Kuala Lumpur (2000); Field study (2017)

Table 1 shows the evolution of the affordable housing in Malaysia from the year 1956 until 2020. The space standard in housing policy shows increment through the period of development by the government where it starts from the lowest 400ft^2. The space standard then gradually increases to 530ft^2 in the year 1982 to 1996. After the year 1999 to 2009, it reached the space standard of 650ft^2 with 3 bedrooms in the low-cost housing. The current space standard of low-cost housing developed with a minimum unit space of 700ft^2 based on the ninth Malaysia Plan. The increasing space standard of low-cost housing provides a larger space for the increasing population and a larger household.

Figure 2 shows the evolution of space standard for low-cost, low medium-cost and medium-cost affordable housing in Malaysia. The evolution of space standards implemented based on the housing development as shows in Table 2.

Figure 2: The evolution of space standard for affordable housing

Source: Malaysia Plan (1966-2020)

Table 2: Space standard implemented in Malaysia Plan

The Evolution of Space Standard		
Affordable Housing	**Space Standard**	**Malaysia Plan (MP)**
Low Cost	400	1st to 3rd MP
	530	4th to 6th MP
	560	7th MP
	650	8th to 9th MP
	700	10th to 11th MP
Low Medium	750	7th MP
Medium	800	Before 9th MP
	800 - 850	10th to 11th MP

Source: Malaysia Plan (1966-2020), Field study (2017)

3. HOUSING AFFORDABILITY

The housing affordability closely related between the household income and expenditure ability. The affordable housing is no longer name as "affordable" where the housing cost exceed 30% of household income considered as burden to cover and spend on other expenses (O'Dell, Smith, & White, 2004)

Table 2: Housing Affordable Rating

Rating	House Price-to Income Ratio
Severely Unaffordable	5.1 & Above
Seriously Unaffordable	4.1 to 5.0
Moderately Unaffordable	3.1 to 4.0
Affordable	3.0 & Below

Source: National Property Information Centre and 12th Annual Demographic International Housing Affordability Survey (2016)

Table 3: House Price-to Income Ratio in Kuala Lumpur

House Price-to Income Ratio in Kuala Lumpur				
Year	**Median house Price**	**Median Income per month**	**Median Income per annual**	**Ratio**
2012	RM 341000	RM 5800	RM 69600	4.9
2014	RM 490000	RM 7600	RM 91200	5.4

Source: National Property Information Centre and 12th Annual Demographic International Housing Affordability Survey (2016)

Table 3 shows the affordability of low and medium income residence in Kuala Lumpur to own a house in the year 2012 and 2014. In the year 2014, the median house price is RM490, 000 and median income stated RM91, 200 per annual which stated severely unaffordable to purchase first house. Through the Median Multiple method, the ratio shows that low and medium income group are not afforded to own a house in year 2012 and 2014. The house price to income ratio stated in year 2012 is in the range of 4.1 to 5.0 whereas year 2014 state above 5.1 which is unaffordable to own a house as shown in Table 2.

Table 4: Housing affordability rating of Malaysia affordable housing scheme

| No.	Type of Housing	Housing Scheme	House Price		Required Household Income		House Price to Income Ratio	
			Low range	High range	Low range	High range	Low range	High range
1.	Low-cost Housing	PPR	RM35,000		RM2,500		1.2	
2.		RUMAH SELANGORKU	RM42,000		RM3,000		1.2	
3.	Medium-cost Housing	PR1MA	RM100,000	RM400,000	RM2,500	RM 7,500	3.3	4.4
4.		MyHome 1	RM50,000	RM120,000	RM3,000	RM4,000	1.4	2.5
5.		MyHome 2	RM120,000	RM270,000	RM4,000	RM6,000	2.5	3.8
6.		RUMAWIP	RM300,000		RM 10,000		2.5	
7.		RUMAH SELANGORKU	RM150,000	RM200,000	RM3,000	RM6,000	4.2	2.8

Based on the house price to income ratio in Table 2, the level of affordability is tested on the Malaysia affordable housing schemes as shows in Table 4. The affordable housing schemes consist of low and medium-cost housing which relate to its specific housing price and income group. The criteria of government introduced affordable housing is selected based on the minimum and maximum range of house price launched whereas the lowest and highest household income for the application requirement is used to calculate the affordability ratio. Table 4 shows all low-cost housing fulfilled the level of affordability whereas not all the medium-cost housing fulfils the level of affordability

4. MALAYSIA HOUSING POLICY

Housing is the fundamental needs of human where it closely relate to the urban economy development in the country (Baqutaya et al., 2016). The government provide quality housing to ensure housing developed are adequate for Malaysia citizen the housing

policies and schemes implemented. The Figure 3 shows the housing policy development stages correlate with the Malaysia Plan from the early stages of independence in year 1957 until the National Transformation Policy in year 2020. During the early stage of independence, Malaysia government focus on the relocation of settlement to low-cost housing and eliminate poverty. The housing plan is then implemented to ensure Malaysian access adequate quality affordable housing. Malaysia government encourage private sector to involve in the construction of low-cost housing to increase the supply of affordable housing based on specific income group. Current development of housing plan implemented to provide high quality and environmentally sustainable affordable housing

Figure 3: Malaysia housing policy development stage
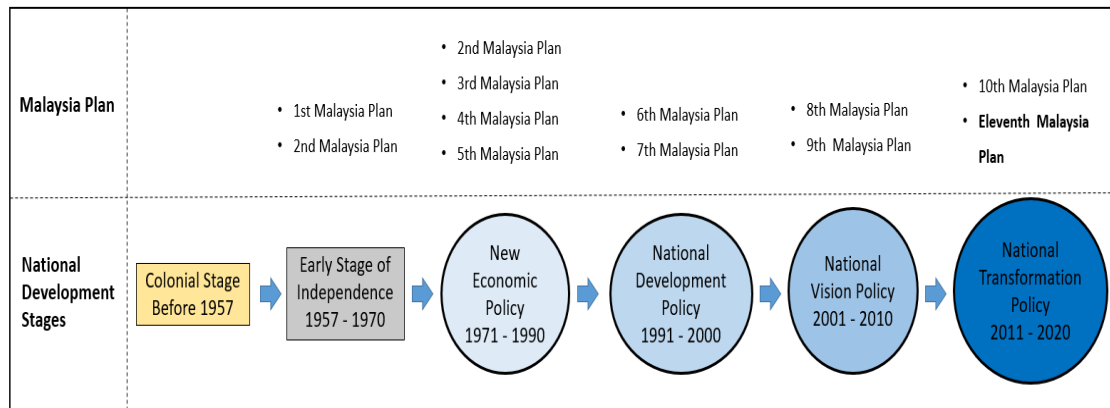
Source: (Economic Planning Unit, 2015), Malaysia Plan (1966-2020)
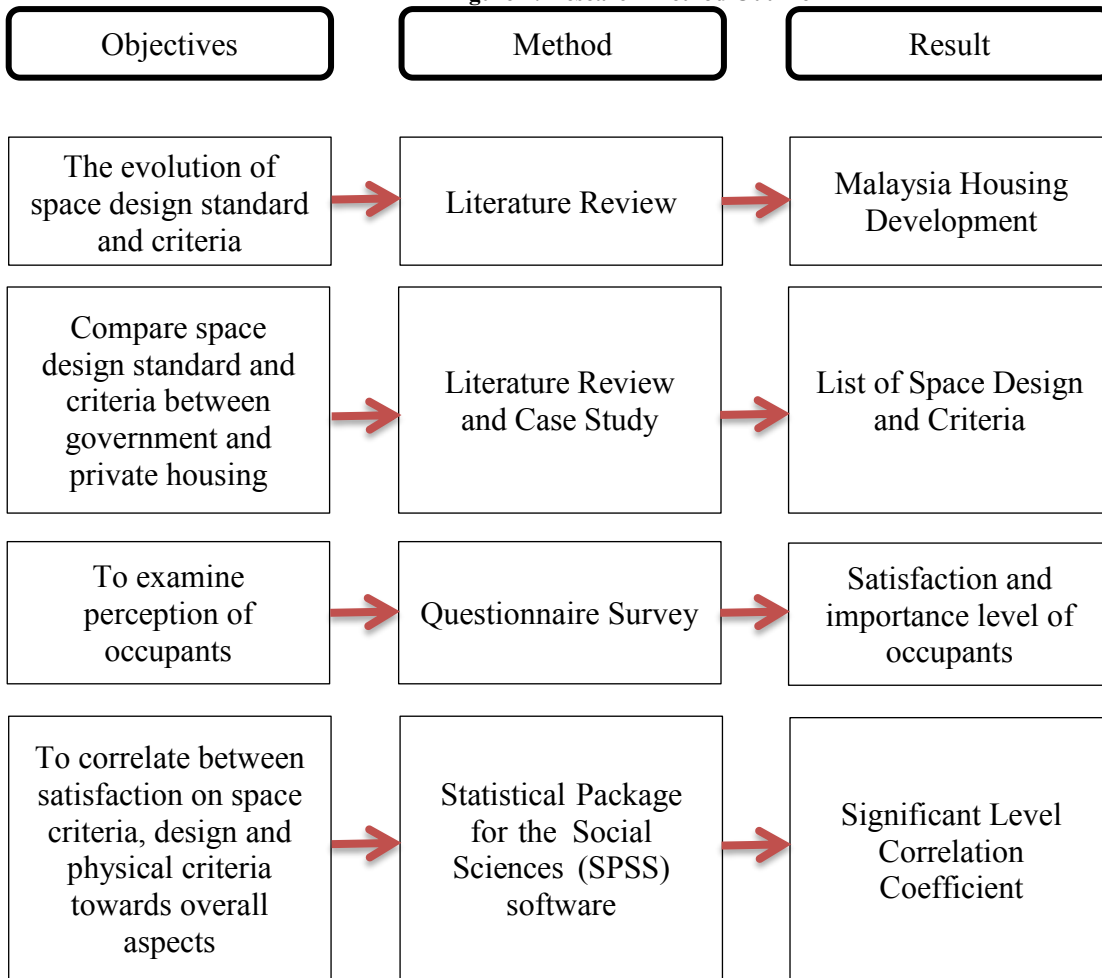
5. METHODOLOGY

The main objective to carry out this paper is to identify the evolution of space design standard and criteria of affordable housing in Kuala Lumpur. The method to study perception of occupants regarding to the space design criteria of affordable housing conducted through questionnaire distribution.

Prior to the actual empirical work, pilot survey of 30 samples of questionnaires distributed to Kasturi apartment and Cendana apartment located at Bandar Sri Permaisuri. Primary data collection consists of 4 case study buildings selected based on the medium-cost affordable housing scheme to analyse the perception of occupants through questionnaires distribution. This research paper carried out in 5 stages which are preliminary study, develop theory, field study, data analysis, and finding and conclusion. The stage 1 of preliminary stage to identify the problem related to current field study and issues followed by determine research area and research topic. In stage 2, one of the objective to identify the evolution of space design through reading and research to obtain the information. The stage 3 of data collection carried out by using primary and secondary data sources to obtain information on completing the research.

Qualitative and quantitative research approach provides a depth investigation to the research problem.

By distributing questionnaires to occupants in selected case study, descriptive analysis and statistical analysis are used to analyse the correlation of this research objective. The result generated through SPSS shows excellent internal consistency of Cronbach's Alpha score which is 0.948 for total 87 items. The total sample size collected is 128 questionnaires with respond rate of 30% (Krejcie & Morgan, 1970).

Figure 4: Research Method Outline

Objectives	Method	Result
The evolution of space design standard and criteria	Literature Review	Malaysia Housing Development
Compare space design standard and criteria between government and private housing	Literature Review and Case Study	List of Space Design and Criteria
To examine perception of occupants	Questionnaire Survey	Satisfaction and importance level of occupants
To correlate between satisfaction on space criteria, design and physical criteria towards overall aspects	Statistical Package for the Social Sciences (SPSS) software	Significant Level Correlation Coefficient

Source: Field study (2017)

6. CASE STUDY BACKGROUND

The background of case study buildings selected including the space standard, design criteria, background and facilities. Case study of this research is to determine the perception of occupants in medium-cost affordable housing from government housing scheme. Total 4 case study buildings selected which is Lestari Apartment, Lumayan Apartment, Alam Prima apartment and Pr1ma @ Presint 11, Putrajaya.
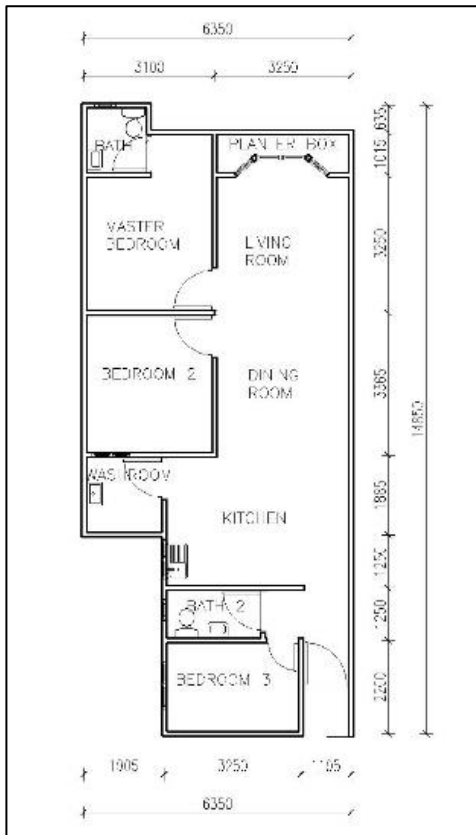
Figure 5: Floor layout of Lestari Apartment　　**Figure 6: Floor layout of Lumayan Apartment**
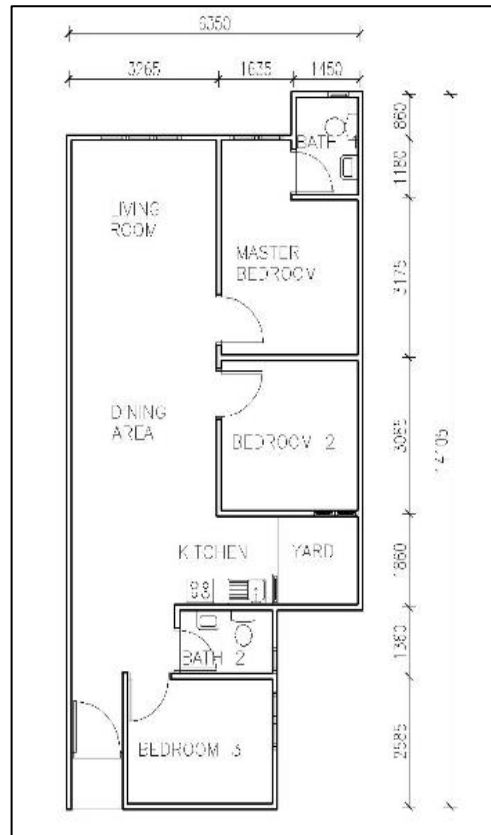

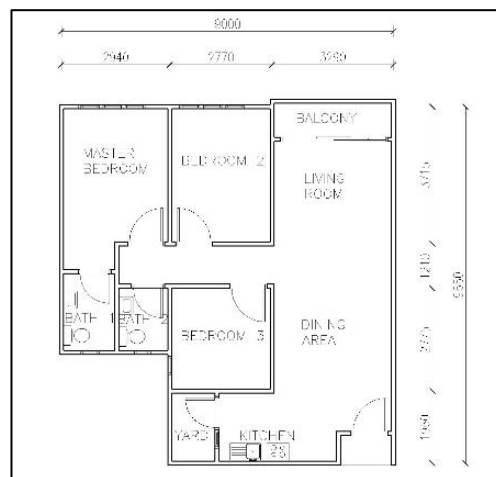**Figure 7: Floor layout of Alam Prima Apartment**

Table 5 shows the summary of space criteria and facilities provided from case study buildings. The government and private affordable housing is compare through three aspects which is the space criteria, community facilities and sports facilities. None of the affordable housing provide storeroom to domestic materials and items. The building design for private housing does not construct with balcony compare to government housing from SPNB and PR1MA.

Table 5: Summary of space criteria and facilities

Case Study / Spaces & Facilities	Private Housing		Government Housing	
	Lestari Apartment	Lumayan Apartment	Alam Prima Apartment	PR1MA @ Precinct 11
Space Criteria				
Floor area	820	830	850	815
3 Bedrooms	/	/	/	/
2 Bathroom	/	/	/	/
Living room	/	/	/	/
Dining room	/	/	/	/
Kitchen	/	/*	/	/
Washroom	/			
Storeroom				
Balcony			/	/
Planter box	/			
Yard		/	/	/
Facilities — Community				
24hr Security	/	/	/	/
Indoor Car park	/	/	/	/
Outdoor car park	/	/	/	/
Motorcycle Parking	/*	/*	/*	/*
Disable car parking			/	/
Multipurpose Hall	/	/	/	/
Musolla			/	/
Prayer room	/	/		
Nursery	/	/	/	/
Shop lots	/	/	/	/
Refuse chamber	/	/	/	/
Letter box room	/	/	/	/
Reading room	/	/	/	/
Management office	/	/	/	/
Facilities — Sports				
Swimming Pool	/	/	/	
Play ground	/	/	/	/
Badminton court			/*	/
Recreation area	/	/	/	/

*means does not meet the required condition/needs

7.0 RESEARCH ANALYSIS AND FINDING

Figure 8 demonstrate the ethnicity of respondent based on case study 1, 2, 3 and 4. The medium-cost housing consists of respondents from different race where majority of respondents are Malay stated more than 80% based on Figure 8. Case study 1 and 2 consist of Chinese respondents which stated around 10% whereas there are no Chinese respondent in case study 3 and 4. Other than case study 2, there are low number of other races respondents which reached the highest 3 respondents for case study 3 and 1 respondent for case study 1 and 4.
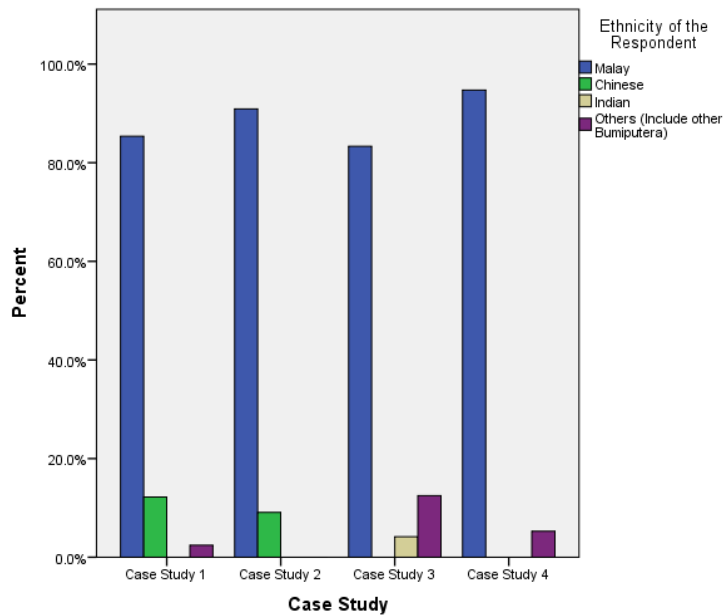
Figure 8: Graph of ethnicity of respondent

Table 6 below shows the cross tabulation of total household size and the case study building. The mean value of household size calculated based on each case study to the average number per household in a family. The mean value of household size for case study 2 and 4 stated 4.16 and 4.06 person respectively where case study 1 and 3 stated 3.93 and 3.79 person respectively in a family. The average household size in Malaysia is 4.3 person per household (Department of Statistics Malaysia, 2014). Based on the analysis for case study, the average person per household is 3.99 which are lower than the current national household size.

Table 6: The total household size of respondent

Total Household Size	Case Study				Total
	Case Study 1	Case Study 2	Case Study 3	Case Study 4	
1	1	0	1	1	3
2	5	3	5	3	16
3	18	11	4	2	35
4	6	12	6	3	27
5	4	4	6	6	20
6	2	3	1	3	9
7	3	3	0	0	6
8	0	1	1	0	2
9	1	0	0	0	1
10	1	0	0	0	1
Total	**41**	**37**	**24**	**18**	**120**
Mean	3.93	4.16	3.79	4.06	**3.99**

Standard Deviation	1.916	1.500	1.587	1.552	**1.663**

Figure 9 shows household monthly income of respondent in 4 case study buildings. The average household income in case study 1 is in the range of RM 4001 to RM5000 whereas the current highest percentage of 22% respondents' household income is from RM3001 to RM5000. Compare to case study 2, average income achieved within RM3001 to RM4000. The case study 3 stated the highest mean value of household income which is in the range of RM5001 to RM6000. There is only 1 of respondent having income more than RM10,000 household income. Based on the research, the percentage of tenant is 60% shows that most of the occupants are not the owner of residential unit. Lastly, majority of respondents' household income which exceeded 60% do achieve household income RM2001 to RM3000. All respondent in case study 4 does not exceed the income requirement of RM7,500.

Figure 9: Respondent household monthly income
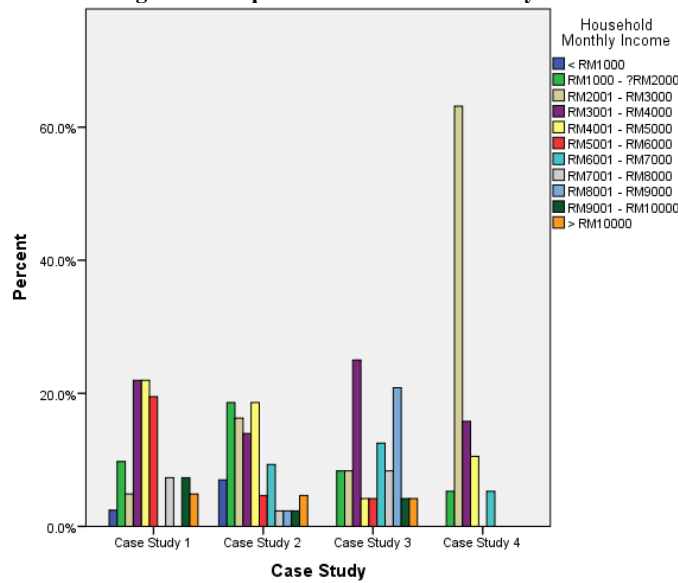
7.1 Satisfaction level of space criteria

The highest satisfaction level for space criteria is the combined living room and dining area for case study 1, 2, and 3 where it ranked second for case study 4 as shows in Table 7. The mean score for living room achieved 3.29, 3.68, and 3.50 respectively where it ranged within "slightly satisfied" and "satisfied". Compare among the case study building, the largest area which is 24.3m2 from case study 2 where it meets the satisfaction of occupant.

The satisfaction level for balcony, storage room and yard achieved the lowest satisfaction level among all the space criteria. Case study 1 stated lowest satisfaction level of dissatisfied for balcony and storage where it is because there are not constructed in the housing unit. The dissatisfaction expressed by the occupants towards the lack of area for storeroom. This triggered the concern of occupants on the issue related to insufficient storage area.

Table 7: Satisfaction level of space criteria

Satisfaction level of space criteria	Case study							
	Case study 1		Case study 2		Case study 3		Case study 4	
	Rank	Mean	Rank	Mean	Rank	Mean	Rank	Mean
Living Room Size	1	3.29	1	3.68	1	3.50	2	3.84
Bedroom Size	2	3.05	3	3.55	2	3.29	1	4.05
Toilet Size	3	2.95	2	3.57	3	3.17	2	3.84
Bathroom Size	3	2.95	2	3.57	3	3.17	3	3.79
Kitchen Size	4	2.61	4	3.36	5	2.92	3	3.79
Balcony Size	7	2.26	6	3.24	4	3.00	6	3.47
Storage Size	6	2.27	5	3.28	7	2.29	5	3.53
Yard Size	5	2.59	7	3.20	6	2.67	4	3.74

(1=Extremely dissatisfied; 2=Dissatisfied; 3=Slightly satisfied; 4=Satisfied; 5=Extremely satisfied)

7.2 Importance level of space criteria

The overall mean score for all the space criteria achieved above 4.0 which is "important" and near to "most important" which is within 4.00 to 4.37 as shows in Table 8. This shows that the demand of space size highly affects the satisfaction of occupants. The importance level of storage room size is ranked number 6 out of 8 space criteria with a mean score of 4.16. This shows that the least satisfaction of storage room provided but it is important to provide storage space for occupant to store their domestic materials or items. The least importance of space criteria is the balcony and yard compare to other spaces but it does not mean it is not important to the occupants.

Table 8: The importance level of space criteria

Importance Level	N	Minimum	Maximum	Mean	Std. Deviation
Bedroom Size	128	2	5	4.37	.774
Kitchen Size	128	2	5	4.37	.732
Living Room Size	128	2	5	4.33	.764
Bathroom Size	128	2	5	4.27	.811
Toilet Size	128	2	5	4.27	.796
Storage Size	121	1	5	4.16	.904
Yard Size	123	1	5	4.09	.984
Balcony Size	119	1	5	4.00	1.025

(1=Most unimportant; 2=Unimportant; 3=Slightly important; 4=Important; 5=Most important)

7.3 The Spearman Correlation Test between space criteria and overall satisfaction of space

The result from Table 9 shows there is significant association between the space criteria and overall satisfaction level for in term of space, p value < 0.01 (p=0.000). The correlation coefficient shows that bedroom size, living room size, toilet size, bathroom size, balcony size and yard size having positive strong relation with overall space satisfaction and it is statistically significant. This can be explained that when the satisfaction level of occupants on space criteria increase, the overall satisfaction level in term of space for residential unit will be increase. This finding is concordance with the previous research on the space adequacy and the room size (Mahmud et al., 2012).

Table 9: Spearman correlation test between space criteria and overall satisfaction on space

Space Criteria	Satisfaction for overall aspects in terms of space	
	Spearman Correlation Coefficient	Significant level
Bedroom Size	0.533**	0.000
Living Room Size	0.650**	0.000
Kitchen Size	0.496**	0.000
Toilet Size	0.553**	0.000
Bathroom Size	0.641**	0.000
Balcony Size	0.517**	0.000
Storage Size	0.461**	0.000
Yard Size	0.509**	0.000

**. Correlation is significant at the 0.01 level (2-tailed).

7.4 Spearman Correlation Test between space design criteria and overall satisfaction on design
The result from Table 10 shows there is significant association between the space design criteria and overall satisfaction level for in term of design, p value < 0.01 (p=0.000). This can be explained that the design criteria are strongly related to overall design of building. As the satisfaction level of design criteria increase, the overall satisfaction on design will be increase.

Table 10: Spearman Correlation Test between design criteria and overall satisfaction on design

Design criteria	Satisfaction for overall aspects in terms of design in residential unit	
	Spearman Correlation Coefficient	Significant level
Size of window	0.707**	0.000
Total number of window	0.556**	0.000
Type of material for floor finishes	0.647**	0.000
Quality of workmanship of floor finishes	0.684**	0.000
Type of paint for wall finishes	0.693**	0.000

Quality of workmanship of wall finishes	0.718**	0.000

**. Correlation is significant at the 0.01 level (2-tailed).

7.5 Spearman Correlation Test between physical criteria and overall satisfaction of physical space.

The result from Table 11 shows there is significant association between the space design criteria and overall satisfaction level for in term of design, p value < 0.01 (p=0.000). Since the p value is 0.000, it has evidence to believe that physical criteria and overall satisfaction level on physical aspect are monotonically correlated in population. The correlation value, r stated more than 0.700 with significant level of p=0.000. This can be explained that the physical criteria are strongly related to overall design of building.

Table 11: Spearman correlation Test between physical criteria and overall satisfaction

Physical criteria	Satisfaction for overall aspects in terms of physical space in residential unit	
	Spearman Correlation Coefficient	**Significant level**
Height of spaces	0.705**	0.000
Route to the entrance door	0.743**	0.000
Differences of floor level	0.731**	0.000
Route area	0.778**	0.000

**. Correlation is significant at the 0.01 level (2-tailed).

8.0 COMPLIANCY OF SPACE STANDARDS

Space standards from (Construction Industry Standard 2, 1998; Construction Industry Standard 4, 2005; UBBL 1984, 2012) are used to examine case study buildings whether it comply with the minimum requirement of space criteria as shows in Table 12. It is arranged in the order where UBBL is for lowest requirement, followed by CIS 2 and CIS 4 is for low and low medium-cost housing respectively.

The finding shows that master bedroom, bedroom 2 and bedroom 3 for all case study buildings comply with only two standards which are UBBL and CIS 2 as shows in Table 12. Bathroom 1 in case study 1 and bathroom 2 from case study 3 do not comply with CIS 4 whereas the other case study buildings do comply with all three space standards. The table shows that only case study 2 does not comply with all three standards whereas case study 2 and 3 are compliance to all standard

Table 12: Space standard compliancy

Space Criteria	Space Standards			Case Study			
	UBBL	**CIS 2**	**CIS 4**	**1**	**2**	**3**	**4**
Category of housing	**All**	**Low-Cost**	**Low medium-cost**	**Medium-cost**			
Master bedroom	11.00	11.70	12.80	11.70	11.70	12.05	N/A
Bedroom 2	9.30	9.90	11.80	10.45	9.50	10.30	N/A
Bedroom 3	6.50	7.20	9.90	7.15	8.45	7.70	N/A
Kitchen	4.50	5.40	6.00	11.15	3.95*	6.45	N/A
Bathroom 1	2.00	1.80	2.70	2.55	2.95	3.30	N/A
Bathroom 2	1.50	1.80	2.70	2.95	2.90	2.65	N/A

(Green: comply to all three standards; Orange: complies to UBBL and CIS2; Red: none of the standards are comply)

9.0 DISCUSSION

This paper consists of two important aspects that discussed about the finding of data analysis. First, the overall satisfaction level in term of spaces, design, physical aspects, and building services achieved mean score of "slightly satisfied" to "satisfied". In the aspect spaces provision, the living room size and bedroom size stated highest satisfaction level compare to storage size is the least satisfied. The level of importance falls in the range of "important" to "most important" to provide sufficient space to occupants. The rooms such as storage, kitchen, balcony, and yard are still considered insufficient to serve its purposes. This study supported by the research conducted by (Mahmud et al., 2012) on the inadequacy of storage area. This explains that the provision of space criteria in medium-cost housing consist of a mismatch with occupant's desirable space.

Secondly, the space standard from UBBL stated the minimum requirement to be achievement for every building construction either in lower or upper segment housing. Considering the minimum requirement, medium-cost housing that complying with all space standards are not a major concern as the size is generally larger. Issue arises when space criteria are compared to CIS 2 for low-cost housing and CIS 4 for low medium-cost housing. Even though case study buildings are medium-cost housing, the space criteria do not completely comply with the standards for lower segment of housing. This shows that there are no specific space standards for medium-cost housing. It shows relative agreement to study done by (Aziz et al., 2011) where he reported that one of the issue arises on space design quality due to there are no specific standard and design guideline on medium-cost housing.

10.0 CONCLUSION

The first objective of this paper discussed on the development of housing policy which is the evolution of space design standard of affordable housing since early stage of independent. Through review on Malaysia housing policy and Malaysia Plan, it clearly shows that government taking a large step to increase quality of living, meet demand and constantly upgrade minimum space standard. Housing affordability is much concern whether a particular household afford to own a house with the earning they have. By conduction house price to income ratio for affordable housing in Malaysia, PR1MA housing scheme does not meet affordability rating which is within moderately and seriously unaffordable.

Quantitative research method is used to conduct questionnaire survey on four case study building developed by private and government agency. The finding shows that the highest satisfaction level on space criteria is the living room size, bedroom size and bathroom size. The least satisfied space criterion is the storage room. This due to most of housing does not provide space to store domestic items and there is no specific standard size for storage room enforced. Space criteria of case study buildings are examined to check the compliancy towards housing standards and guide line. Considering importance level of the space criteria, the size of bedroom and kitchen stated the highest mean score whereas the least important is the balcony and yard. To solve the problem on the dissatisfaction of storage provision, it is recommended that the guide line and standard for storage is enforced for every housing development.

Basically, the significant of this paper is to provide basic housing design approach with an adequate minimum space for resident's satisfactions focusing on medium income group where this concept offer a home with a bedroom, kitchen, living room and toilet. Government should take it seriously when it comes to provide medium cost affordable housing in Malaysia. This paper shall alert government in reviewing or revising and improving the evolution of construction design standards, housing scheme, and the guidelines of the development of an affordable housing in Malaysia. As from part of this paper, not all types of affordable housing in achieve "affordable rating" to medium income group in Malaysia.

Joint ventures with private sector generally focus on profit margin for a construction project. Despite complying the minimum requirement of space standard, housing price will be selected at a higher range in order to gain more profit. The space criteria for medium-cost housing based on case study buildings conducted are considered as satisfied for occupants. Overall development of affordable housing constructed with community and sports facilities which promote a quality living for occupants.

The purpose to conduct this research is to identify the evolution of space design criteria and identify occupant satisfaction and importance level in affordable housing. Questionnaire survey is one of the methods used to analyse the perception of occupants on the space design criteria of affordable housing. There are limitation and obstructions faced during the period of conducting this research that might affect the assessment of data. Application to do questionnaire survey at the selected case study building was delayed due to the bureaucracy. The process of getting approval took time to commence data collection stage in advance. The housing management reluctant to give permission to conduct the survey due to the privacy of the occupants. Besides, there are unavailable of detailed building layout plan form building management. This is due to the privacy on exposing information related to the building.

11.0 RECOMMENDATION

Malaysia housing policies, standards and guideline on the housing development provide the minimum requirement to fulfil the needs of occupants by living in quality housing. The government should consistently revise the standards and guideline on housing development to provide adequate space criteria. Uniform Building By-Law 1985 should enforce specific size of storage room for housing construction which based on this research analysis supported by several researches conducted on space adequacy.

The finding of this research shows that there are no specific standards for medium-cost housing. Referring to UBBL 1985 that encompasses lowest requirement to achievement by all categories of housing. Compare to CIS 2 and CIS 4 was introduced for low and low medium-cost housing only. This finding suggested that space standards for medium-cost housing should implemented with specific space criteria that meet the requirement of medium income group. It is also suggested that medium-cost space standard should achieve a specific percentage of increment from the minimum requirement of UBBL. In order to provide quality housing, government should introduce the latest space standards for both low and medium-cost housing.

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