

# Classification of High-Rise Residential Building Facilities: A Descriptive Survey on 170 Housing Scheme in Klang Valley

Siti Rashidah Hanum Abd Wahab<sup>1,2</sup>, Adi Irfan Che Ani<sup>1</sup>, Ahmad Sairi<sup>3</sup>, Norngainy Mohd Tawil<sup>1</sup>, Mohd Zulhanif Abd Razak<sup>1</sup>

<sup>1</sup>Department of Architecture, Faculty of Engineering & Built Environment, Universiti Kebangsaan Malaysia (UKM)

<sup>2</sup>Department of Polytechnic Education, Ministry of Higher Education Malaysia

<sup>3</sup>Department of Building Control, Kajang Municipal Council (MPKJ), Selangor

**Abstract.** High-rise residential building is a type of housing that has multi-dwelling units built on the same land. This type of housing has become popular each year in urban area due to the increasing cost of land. There are several common facilities provided in high-rise residential building. For example playground, swimming pool, gymnasium, 24 hours security system such as CCTV, access card and so on. Thus, maintenance works of the common facilities must be well organised. The purpose of this paper is to identify the classification of facilities provided at high rise residential building. The survey was done on 170 high-rise residential schemes by using stratified random sampling technique. The scope of this research is within Klang Valley area. This area is rapidly developed with high-rise residential building. The objective of this survey is to list down all the facilities provided in each sample of the schemes. The result, there are nine classification of facilities provided for high-rise residential building.

## 1 Introduction

In urban area, the demand for high-rise residential building increases each year due to the increase in house and land prices [1]. People prefer to live in high rise residential building due to the present lifestyle of people in the city [2]. Furthermore, the increasing population and income nowadays caused the increasing demand of high-rise residential building. For example 27.5% of Sydney, 84% of Singapore and more than 95% of Hong Kong population lives in high rise building [3]. In addition, the vicinity facilities of high-rise residential building such as Mass Railway Transit (MRT) and shopping complexes attract people in the city to own units in high-rise residential buildings. In addition, there are several common facilities provided in high-rise building scheme that can be enjoyed by the residents such as swimming pool, gymnasium, landscape, 24 hours security system, sports court and so on. Thus, these facilities must be well maintained to ensure its functionality. All the cost of maintenance works are come from the maintenance fees. This maintenance fees are imposed on the resident's responsibility. As mentioned by [4] a good management service must have a good financial support. But, managing high-rise building in Malaysia is still new and the experience managing high-rise properties have been inconsistent due to lack of maintenance fund [1, 4]. There

are many arguments occur between management body and residents on the maintenance fund. Residents are refuse to pay the maintenance fees because they claimed that the value of maintenance fund is not comparable with the facilities provided at their scheme [1, 5, 6]. Some declare they do not use all the facilities provided and refuse to pay the maintenance fees [1, 7]. Otherwise, residents request to know the transparency flow of maintenance fund allocation [6]. Therefore, the objective of this paper is to categories all the facilities provided at high-rise residential building scheme. This can be a guide for the management to determine the realistic maintenance cost to be imposed on the residents of high-rise building. These classification is important to create better management system for high rise residential building. Then, it can give clear definition on the type of high-rise residential based on its facilities rather than based on the price and its location. In addition, management body can used this classification as a guide to determine the realistic maintenance cost to be imposed on the residents of high-rise building scheme. Table 1 shows the possible facilities provided at high-rise residential building gathered from literature and several guidelines.

**Table 1.** Availability of Facilities at High-Rise Residential Building

No	Classification	Facility code	Facility	Sources																					
				[10]	[7]	[11]	[5]	[6]	[12]	[13]	[14]	[15]	[16]	[17]	[18]	[19]	[20]	[21]							
1	Religious Facility	FK1	Surau	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√			
		FK2	Prayer room	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√		
2	Education Facility	FPD1	Kindergarten	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√		
		FPD2	Day Care	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	
		FPD3	Mini library	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
		FPD4	Internet Wi-Fi Room	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
3	Community Facility	FPK1	Multi-purpose Hall	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	
		FPK2	Meeting Room	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√

<sup>a</sup> Corresponding author: siti.rashidah.hanum@gmail.com

No	Classification	Facility code	Facility	Sources																	
				[10]	[7]	[11]	[5]	[6]	[12]	[13]	[14]	[15]	[16]	[17]	[18]	[19]	[20]	[21]			
4	Commercial Facility	FRP1	Retail shop																		
		FRP2	Laundry																		
		FRP3	Salon/beauty centre																		
		FRP4	Stationery																		
		FRP5	Tailor shop																		
		FRP6	Car Wash																		
		FRP7	Mini Post Office																		
		FRP8	Restaurant/ cafeteria																		
		FRP9	Clinic																		
		FRP10	Office lot																		
5	Open Recreation Facility	FRTB1	Benches																		
		FRTB2	Landscape																		
		FRTB3	playground																		
		FRTB4	BBQ Area																		
		FRTB5	Jogging track																		
		FRTB6	Outdoor sport court																		
		FRTB7	Rooftop garden																		
6	Closed Recreation Facility	F RTP1	Indoor sport room																		
		F RTP2	Swimming pool																		
		F RTP3	Spa/Sauna																		
		F RTP4	Jacuzzi																		
		F RTP5	Gymnasium																		
		F RTP6	Karaoke room																		
		F RTP7	Club house																		
7	Security Facility	FKS1	Guard house																		
		FKS2	CCTV																		
		FKS3	Access card																		
		FKS4	Intercom																		
		FKS5	Perimeter fence																		
8	Parking Facility	FTLK1	Open parking area																		
		FTLK2	Multi storey parking																		
9	Building Services Facility	FPB1	Toilet																		
		FPB2	Lift																		
		FPB3	Garbage chute/house																		
		FPB4	Store																		
		FPB5	Firefighting equipment																		

**Table 2.** Non-Low Cost High-rise Residential Building Scheme in Klang Valley

No.	Zon/PBT	Housing Scheme	Rate	Approximate Sample Size	Sample Size
1	<i>Wilayah Persekutuan Kuala Lumpur</i>				
	DBKL (Kuala Lumpur area)	790	0.447	75.92	76
2	<i>Selangor</i>				
	MPSJ (Petaling area)	212	0.120	20.37	20
	MBPJ (Petaling area)	150	0.085	14.41	14
	MPKj (Hulu Langat area)	138	0.078	13.26	13
	MPS (Gombak area)	121	0.068	11.63	12
	MPAJ (Gombak and Hulu Langat area)	119	0.067	11.44	11
	MBSA (Petaling area)	90	0.051	8.65	9
	MPK (Klang area)	86	0.049	8.26	8
	MPSp (Sepang area)	22	0.012	2.11	2
	MDHS (Hulu Selangor area)	17	0.009	1.63	2
	MDKS (Kuala Selangor area)	12	0.007	1.15	1
	MDKL (Kuala Langat area)	11	0.006	1.06	1
	MDSB (Sabak Bernam area)	1	0.001	0.09	1
	<b>Total</b>	<b>1769</b>			<b>170</b>

## 2 Research Method

In Malaysia, there are 67.4% non-low cost high rise residential building were built in the area of Klang Valley [1, 6]. Klang Valley is an economic centre of Malaysian country. Therefore, the sample used in these area already met the sampling requirement for the purpose of the study [6]. There are 1,769 non-low cost high rise residential building scheme in Klang Valley.

By using stratified random sampling technique, there are 170 non-low cost housing scheme were selected in the area of Klang Valley to do a survey on the availability of high-rise building facilities (refer table 2). The objective of the survey is to categories all the facilities provided at Malaysian non-low cost high-rise residential building scheme.

## 3 Analysis and Results

This study used an analysis factor to classify all the facilities provided in non-low cost of high-rise residential building in Malaysia. Therefore, principle component analysis (PCA) with varimax rotation was used to classify the facilities [22]. Table 3 shows the value of KMO for the availability of facilities was 0.842. This value is more than 0.7 which indicates that the number of samples used is sufficient to undergo analysis factor. The value of Bartlett's Test of Sphericity is significant (less than 0.001) means that the independent variables is suitable for analysis factor [23].

**Table 3.** KMO dan Bartlett's Test

KMO dan Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.842
Bartlett's Test of Sphericity	Approx. Chi-Square	56955.682
	df	946
	Sig.	.000

Furthermore, the percentage of variance explained was 72.092% which is more than 60% of the total variance as proposed by [23] (refer table 4). These value shows that the research data is suitable for next process of analysis factor.

**Table 4.** Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	15.455	35.124	35.124	15.455	35.124	35.124
2	11.339	25.770	60.894	11.339	25.770	60.894
3	4.927	11.197	72.092	4.927	11.197	72.092
4	1.816	4.126	76.218			
44	.001	.002	100.00			

Table 5 shows the results of analysis factor for the availability of facilities at non-low cost of high-rise residential building in Malaysia.

**Table 5.** Analysis Factor

Item	Component		
	1	2	3
Mini Post Office	0.959		
Restaurant/Cafeteria	0.945		
Surau	0.941		
Tailor Shop	0.932		
Salon/Beauty Centre	0.928		
Retail Shop	0.924		
Closed Parking Area/Multi-storey Parking	0.913		
Management Office	0.912		
Playground	0.906		
Garbage Chute/house	0.904		
Open Parking Area	0.888		
Lift	0.860		
Landscape	0.856		
Benches	0.792		
Prayer Room	0.784		
Public Toilet	0.783		
Fire Fighting Equipment	0.746		
Public Store	0.713		
Car Wash	0.668		

Spa/sauna	0.898	
Swimming Pool	0.889	
Indoor Sport Room	0.882	
Guard House	0.874	
Gymnasium	0.868	
Outdoor Sport Court	0.862	
BBQ Area	0.857	
CCTV	0.849	
Jogging Track	0.847	
Rooftop Garden	0.832	
Access Card	0.819	
Club House	0.788	
Perimeter Fences	0.771	
Karaoke Room	0.759	
Intercom	0.736	
Meeting Room		0.931
Mini Library		0.918
Multipurpose Hall		0.914
Internet/Wi-Fi Room		0.904
Day Care		0.868
Kindergarden		0.760

There are 44 items were analysed in the analysis factor and 4 items aborted due to the loading factor less than 0.4 as suggested by [23]. There are 3 factors developed from the analysis. Then, the classification of facilities were renamed according to the Malaysia guideline from KPKT. The first group was classified as basic facilities [12]. The basic facilities has 19 items that consist the combination of commercial, open recreation facilities, parking and building services facilities. The eigen value was 15.455 (significant if more than 1) [23] and contribute 35.124% of the total variance. Then, the second group was classified as exclusive facilities [12, 4 and 6]. The exclusive facilities has 15 items that consist the combination of security, closed recreation facilities and 4 items from open recreation facilities. The eigen value was 11.339 and contribute 25.770% of total variance. The third group was classified as support facilities [12, 6, 14, 15]. This group has 6 items that consist the combination of community and education facilities. The eigen value was 4.927 and contribute 4.126% of total variance.

## 4 Conclusions

In a nutshell, maintenance charges is the main issues and problems related to high-rise residential building. This problem lead to the poor facility maintenance for majority of the high-rise residential scheme. Therefore, this paper determine all the facilities provided at high-rise building according to the nine pre-classifications

identified. After undergo the process of analysis factor, these nine pre-classifications were regroup into 3 new factors which are basic facilities, exclusive facilities and support facilities. Then, the distribution of maintenance cost and expenses can be clarified at later stage according to these 3 classification of facilities. This study will serve as benchmark for the designation of facilities at each type of high-rise residential scheme. Then, the better solution for maintenance cost expenses can be determined at the later stage of this research.

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