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MALAYSIA HIGH RISE RESIDENTIAL LIGHT WELL QUALITY SATISFACTORY ASSESSMENT

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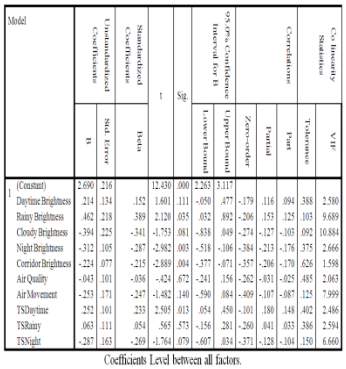
Graphical abstract



Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	2.690	.216		12.430	.000	2.263	3.117					
	Daytime Brightness	.214	.134	.152	1.601	.111	-.050	.477	-.179	.116	.094	.388	2.580
	Rainy Brightness	.462	.218	.389	2.120	.035	.032	.892	-.206	.153	.125	.103	9.689
	Cloudy Brightness	-.394	.225	-.341	-1.753	.081	-.838	.049	-.274	-.127	-.103	.092	10.884
	Night Brightness	-.312	.105	-.287	-2.982	.003	-.518	-.106	-.384	-.213	-.176	.375	2.666
	Corridor Brightness	-.224	.077	-.215	-2.889	.004	-.377	-.071	-.357	-.206	-.170	.626	1.598
	Air Quality	-.043	.101	-.036	-.424	.672	-.241	.156	-.262	-.031	-.025	.485	2.063
	Air Movement	-.253	.171	-.247	-1.482	.140	-.590	.084	-.409	-.107	-.087	.125	7.999
	TSDaytime	.252	.101	.233	2.505	.013	.054	.450	-.101	.180	.148	.402	2.486
	TSRainy	.063	.111	.054	.565	.573	-.156	.281	-.260	.041	.033	.386	2.594
	TSNight	-.287	.163	-.269	-1.764	.079	-.607	.034	-.371	-.128	-.104	.150	6.660

Coefficients Level between all factors.

Abstract

Most commonly, residents are always arguing about the quality of their high rise residential property. A growing number of high rise residential buildings in Malaysia with differing light well were designed by the structural design and planning since 15 years ago. This light well is defined as an intermediate space area between indoor and outdoor of the high-rise residential building. The questionnaire survey of three high rise residential buildings that have different sizes of the light well and building designed were conducted to make clear the occupants' evaluation about the real quality conditions of the buildings. As a result, the quality of light well is clearly satisfied and well managed by the property manager in their high rise residential buildings.

Keywords: High rise residential, quality, assessment, light well, Malaysia

Abstrak

Kebiasaannya, penduduk sentiasa memperkatakan tentang isu kualiti hartanah kediaman bertingkat. Struktur pembinaan hartanah kediaman bertingkat turut mengambil nilai faktor rekabentuk koridor bagi setiap penduduk di kediaman tersebut sejak 15 tahun yang lalu. Koridor ini juga ditakrifkan sebagai kawasan ruang perantaraan antara dalaman dan luaran bangunan hartanah kediaman bertingkat. Kajian soal selidik di tiga hartanah kediaman bertingkat jenis kediaman mewah yang mempunyai saiz koridor yang berbeza telah dijalankan untuk membuat penilaian jelas terhadap penghuni tentang kualiti koridor pada hartanah kediaman bertingkat mereka. Hasilnya, penduduk yang berkaitan amat berpuas hati dengan kualiti koridor serta amalan pihak pengurusan setempat dalam memastikan kualiti hartanah kediaman mereka sentiasa berada pada tahap terbaik.

Kata kunci: Perumahan bertingkat, kualiti, penilaian, lampu koridor, Malaysia

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1.0 INTRODUCTION

High rise residential (HRR) buildings have been constructed in Malaysia in the past decades. Some of them already reach more than 30 years and some of them more than 20 years. Currently, the demand of high rise residential building is increasing from year to year. The statistics as in Figure 1 shows the increasing

number of HRR buildings in Malaysia, which means the quality of every building constructed must be reached the customer requirement. Statistic collected from the Department of Statistic Malaysia [1] shown in Figure 2 shows the number of new launches of housing in Malaysia since quarter 1 2003 till quarter 2 2012 based on the Logarithmic scale with the scale of 10.

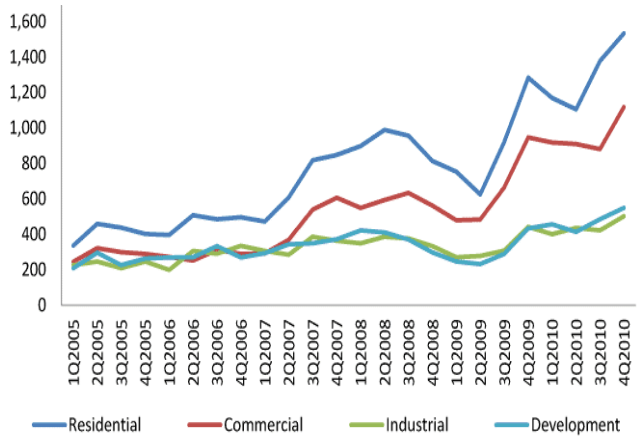

Figure 1 Malaysia Transaction Volume of Properties above RM1mil by Sub-sectors

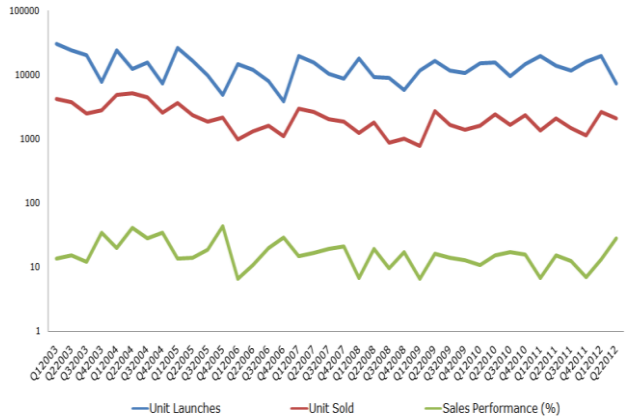

Figure 2 Malaysia New Launches of Housing from Q1 2003 till Q2 2012

2.0 HIGH RISE RESIDENTIAL PROPERTY DEVELOPMENT SCENARIO

The increasing number in high rise residential property development proved that, there is an increasing in demand and the number of the population in this country. In addition, this shows that the amount of development area required for the landed residential development is decreasing [7]. When the demand for these buildings rose significantly, the details in the design of the high rise residential building are very important in conjunction with the scarcity of land and other usage. This situation, coupled with weather and environmental situation in this country. Malaysia is situated in central South-East Asia. It has a total land area of 330,434 km^2 and is divided into two distinct regions: Peninsular Malaysia, which extends from the Thai border down to the island nation of Singapore: and, across the South China Sea on the northern coast of Borneo, the two states of Sabah and Sarawak which are bordered by Indonesia to the south and the Philippines to the east. Being in the tropical region, the climate is hot and humid throughout the year. The mean annual rainfall is 2,500 mm and the temperature ranges from 21°C to 32°C.

The characteristic features of the climate of Malaysia are uniform temperature, high humidity and copious rainfall. Winds are generally light. Situated in the equatorial depression area, it is extremely rare to have a full day with a completely clear sky even during periods of severe drought. On the other hand, it is also rare to have a stretch of a few days with completely no sunshine except during the northeast monsoon seasons. Measurement [6] is one of the reasons why this paper should be worked out and how important it is to be shared as an input to the developer out there to acknowledge the significance of light well in their high rise residential property development. Light well or deep courtyard is commonly used in high-rise buildings and usually implemented to admit daylight and to derive natural ventilation [9]. Nowadays, the attention is being given to energy saving and alternative sources of natural ventilation usage, the use of natural ventilation has become one of the most fundamental strategies.

Compared to Japan, there was significant research has been done and Takai [8] stated that light well is planned in a high rise residential building because summer in Japan is so hot and humid so that, houses need many openings for ventilation to avoid severe climate. The light well that opens to outdoor air can increase the flexibility of opening position. Kotani [4] stated that an open corridor is usually laid out around the light well and this corridor act as public space for the daily activity of the occupants. Even though the design and shape is very diverse, this style will be considered under public space. Therefore, this light well is defined as an intermediate space between outdoor and indoor and has a different condition of environmental from those outdoor and indoor.

Some similar studies which focus on ventilation characteristic of the light will have been conducted. Few researchers have mentioned that there were many doubts and gaps that still remain about the regulation concerning high rise residential buildings which are naturally ventilated via courtyards [2, 3, 5, and 10]. As this study can be determined as a pilot study in Malaysia, the author expects that, it will be an experimental model for further research with some modification of survey by author given in this paper.

In spite of the previous stated reasons, this study has been preceded because they have no regulations or standards on environmental condition focus thoroughly on them. Due to the fact that the author has less information about the light well management and satisfaction of the high rise residential property building that less than 40 stories, so this in another significant reason of running this study.

With the focus of exploratory and experimental study, therefore this study only examined the physical conditions of the light well. Even though author already known that with examining the physical conditions was insufficient, many approaches are needed to establish the regulations, especially on new type of high rise residential buildings particularly in Malaysia. From this standpoint and with a specified determination of this study above mentioned physical study, another approach or research is needed for the healthy building condition and the environment of the light well to be done.

The purpose of this study is to examine the actual environmental condition of high rise residential property light well area as the first step of another approach for future purposes. The author made a questionnaire survey of three high rise residential property buildings with the light well to know the resident's satisfaction of their living environment.

It was clearly exposed that almost all residents satisfied with the present condition except the thermal quality especially in Penang. In this paper, the additional questionnaire surveys of three different high rise residential buildings are carried out and some evaluations of the main environment of the light well are presented structurally.

3.0 METHODOLOGY

Both quantitative and qualitative methods have been used as a research method to achieve the objective of this research. Under qualitative methods is concerned, this research is described to determine a theoretical basis and the factors of light well quality and sustainable involved in performing the evaluation on resident's intention should be at their HRR buildings. All of the factors have been determined and the standard provision of the technical performance in delivering all the information about the selected HRR property is also analyzed. From this method and analysis, a proposed guideline of light well quality assessment as an evaluation tool is suggested to be used for high rise residential property residents with regards to the effect of quality and sustainability of the high rise residential property building itself in Malaysia.

Meanwhile, the quantitative method is referring to the questionnaire survey. The questionnaire survey was carried out as many as 330 forms within 2 months in the year 2011. The questionnaire survey forms are delivered to the selected HRR buildings and the respondents are asked at the same time which approximately 5 minutes per respondents. Outlines of the three selected HRR buildings and the numbers of questionnaire answer recorded are summarized in Table 1.

Table 1 summarized the sections of the light well and high rise residential property building layout. These three high rise residential property buildings have three different and unique light well areas. This condition will determine how significant they are in the building itself based on the resident's satisfactory survey. Reflect on the corridor space, Build. I was larger than the others, followed by Build. III and Build. II. The questionnaires include a brief introduction of the light well with layout image and the point of answer as a guide and simple questions relating to the following aspect

a) Basic info regarding the residents and understanding of the issue.

b) Evaluation about the size and the shape of their building light well and quality of the environments in the high rise residential property building.

c) The frequent usage of the corridor and activities that occurred in the corridor within 24hours.

Table 1 Outlines of three HRR buildings and survey details

	Build. I	**Build. II**	**Build. III**
Location	Johor Bahru	Penang	Putrajaya
Year Of Completion	2001	1997	2002
Number of Floors	29	36	15
Number of Units	170	70	90
Size of Light Well	11.4 x 10.3 x 88.7	[{ ½ x 2 x 22 x 3} + {22 x 2}] x	[{10 x 3} + {7.2 x 4.1}] x
(L x W x H) in meters (m)	11.4 x 10.3 x 88.7	105.8	49.7
	11.4 x 10.3 x 88.7	[{ ½ x 2 x 5.3} + {5.3 x 2.6}] x	3 x 14.6 x 49.7
	11.4 x 10.3 x 88.7	105.8	3 x 14.6 x 49.7
	5 x 5 x 82.6	[{ ½ x 2 x 5.3} + {5.3 x 2.6}] x	3 x 12 x 49.7
	5 x 5 x 82.6	105.8	3 x 12 x 49.7
	5 x 5 x 82.6		
	5 x 5 x 82.6		
Widths of Corridor in meters (m)	2.32	1.89	2.04
Lighting Control in Corridor	Individual control	Individual control	Timer control
Distributed Sheets	170	70	90
Answer Recorded	95	49	56
Percentage of Answer Recorded (%)	56	70	62
		62.6667	
		Total Percentage of Answer Recorded (%)	

Table 2 Coefficients Level between all factors

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations			Co linearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
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	TSNight	-.287	.163	-.269	-1.764	.079	-.607	.034	-.371	-.128	-.104	.150	6.660

4.0 RESULTS AND DISCUSSION

4.1 Brightness Quality

The satisfactory result in the brightness quality focused during the daytime shown in Figure 3. Meanwhile, Figure 4 shows the evaluation results of the corridor within 24 hours usage. Overall, all the residents satisfied with the brightness of the high rise buildings.

Even though the survey result did not reach 100% satisfaction, but the figures show most of them satisfied with the present condition. About more than 80% residents of high rise residential property building in Putrajaya satisfied with their building brightness during day time, cloudy time and night time.

Unfortunately, this number decreases during the rainy time. Based on this condition, residents of high rise residential property building in Penang show lower satisfactory percentage compare to Putrajaya and Johor. Residents of Build. II in Penang did not really care about the present condition. They like to choose neither in the survey. About more than 20% chose dissatisfied with the brightness condition to Build. II especially during rainy time, cloudy time and night time, even for the corridor usage within 24 hours too.

Residents of Build. I in Johor most probably satisfied with the brightness of their building which most of them reach more than 50% satisfaction except for the night time. This might be disturbed with the individual control condition and the unnecessary interrupted by a huge number of kids in that building which liked to play with the light switch. This situation also been captured during the physical survey at night time.

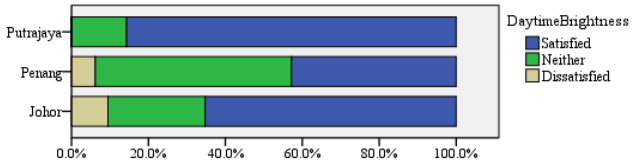

Figure 3 Brightness during the daytime

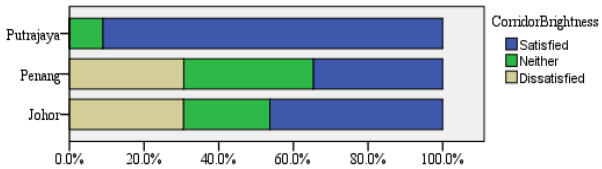

Figure 4 The brightness of the corridor within 24hours

4.2 Air Quality

The evaluations of the air quality satisfactory are shown in Figure 5. The dissatisfaction percentage of air quality in Build. II is higher than others about 5% more than Build. I and 20% more than Build. III. This situation might be supported by the surrounding condition where the outdoor air itself is probably dirty and near to the city main road which the traffic is very heavy. Besides, the Build. II has been developed to near with the other high building as well.

The air movement sensibilities obviously differ evidently shown in Figure 6. Build. II in Penang seriously needs to be considered seems the percentage of rarely on the air movement reached 50% of the residents satisfactory survey compared to the others. This means that there are significant differences with the air movement in the light well amount the buildings by its physical and outdoor conditions based

on the resident's perspective. The sustainable physical condition of Build. III totally supports the resident's satisfaction and all of them agreed that the air movement often happened in their building.

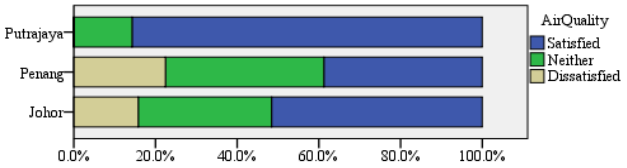

Figure 5 Quality of the air

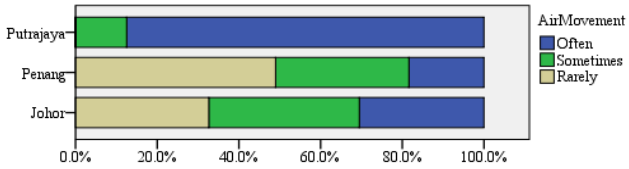

Figure 6 Movement of the air

3.3 Thermal Quality

Malaysia weather benefits from a tropical climate with high temperatures and high humidity throughout the year as shown in Table 1. Daytime temperatures rise above 30°C (86°F) year round and night time temperatures rarely drop below 20°C (68°F). Rain falls fairly evenly throughout the year and the difference between the main October to April rainy season and the rest of the year is not that marked.

Based on this condition, Build. III is shown the perfect environment for the residents. More than 70% of the residents agreed that their building is always cool in various conditions either during day time, rainy time or night time. This statistic totally advanced from the other two buildings. Build. I and Build. II knowingly got more than 20% of their thermal evaluation either during night time, rainy time or day time based on the resident satisfaction survey. Most of the residents even in the different location show that the thermal sensation satisfaction will increase up to 20% during daytime compared to the rainy and night time. This means something is needed to be improved during the design and development process.

Basically, the satisfaction on the environmental survey of these buildings shows that some improvements still need to be considered. The actual situation brought out in this paper has the possibility to indicate some guidelines for new development. Other factors such surrounding development should also be considered for the future development. The most important thing is the new development needs to take into account the satisfaction of the residents when all the units have been occupied and the standards of sustainability to be followed as well. Table 2, shows the coefficient level between all factors considered in this study.

4.0 CONCLUSION

The quality and sustainability assessment of the HRR buildings, particularly in regards to light well was conducted. Although the light well is like the deep well, it turned out that the environmentally friendly and sustainability friendly is almost satisfactory in general. However, it also turned out that there is the difference between the selected HRR buildings in their satisfaction level. This condition seems to be caused by their different physical conditions, locations and environments. The building has had some issues and the sustainable success of the building is very questionable. However, as a basic approached in getting the resident well-known with the scenario and condition, this study at least can help them to understand the particular and the current condition of their light well building.

As an important point, the poor lighting is one of the most commonly identified causes of workplace injuries. It is not surprising, that proper lighting is a key factor of being able to identify and avoid hazards, safely handle dangerous equipment, and deter criminal activity. Though additional lighting means additional costs, the costs of personal injury are often far greater. It is vital to give ample consideration to the lighting conditions of businesses and homes not only with cost in mind, but also the well-being of occupants and visitors.

In terms of Thermal Quality, thermal bridges are the locations of minimal thermal resistance that allow heat to flow directly to the exterior. Thermal bridges can also act as radiant fins such as with non-thermally broken balcony slabs. In all cases, they have a significant effect on building heat loss. Balcony slabs, shear walls, spandrel beams, window frames, shelf angles, and parapet walls all represent areas which provide minimal resistance to heat flow between the interior of the building and the exterior. Thermal bridging at these locations can cause frost and condensation on interior finishes, and discomfort from cold walls and cold floors adjacent to balconies.

Air pollution is responsible for much morbidity and mortality in the world. Its heterogeneous nature, though, means that few generalizations about its cause and effects can be made. Individual pollutants are often discussed in isolation usually with reference to their hazardous properties. Although a better understanding of the health effects from indoor pollutants can be obtained by assessing the overall risk they pose. It is rare, within a domestic setting, that a single pollutant dominates the scene. Ironically, a wealthy lifestyle promotes greater concern about pollution, but in reality it means appreciably less ill health and death from environmental causes.

Generally, there must be a national vision towards green and sustainable architecture in Malaysia. Even though this study was limited to the selected condominium, but, it could be the example for future study in improving this result to the better cover of all types of high rise residential property development. Finally, efforts must be made to ensure that building

occupants are trained in the operation of building systems and energy conscious behaviour to help improve the quality of HRR buildings.

Acknowledgement

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