

# Post-occupancy evaluation of university student hostel facilities: a case study in Hong Kong

Joseph H.K. Lai<sup>1</sup>

## Abstract

With the new 4-year university curriculum of Hong Kong implemented in 2012, the volume of university students has continued to expand, leading to the increasing development of student hostels. In order to assess if the facilities in the hostels have performed to the satisfaction of their end users, it is necessary to carry out post-occupancy evaluations (POEs). A search from the open literature, however, could hardly find any recent POE studies on university hostel facilities in Hong Kong. Therefore, a two-stage POE study targeting a typical hostel was conducted. In the first stage, a research model was formed based on a review of relevant literature and past studies. On this basis and referring to the findings of a focus group discussion among the hostel's end users, a questionnaire was designed for use in a survey. By way of face-to-face interviews in the second stage, the survey solicited the end users' expected performance levels and perceived satisfaction levels of six main aspects of facilities, namely lighting, air-conditioning, fire safety, acoustic, internet, and hygiene. The largest gap between the expectation and satisfaction levels was found with the air-conditioning aspect. Gender was not a factor affecting the orders of perceived satisfaction with the facilities. The importance levels of the various aspects were determined using the analytic hierarchy process (AHP) but the respondents' judgments based on which the AHP weights were computed were not of good consistency. Further work is needed to overcome this deficiency and study if there are factors other than gender that would affect the end users' expected and perceived performances of the hostel facilities.

**Keywords:** expectation, importance, post-occupancy evaluation, satisfaction, university hostel facilities.

---

<sup>1</sup> Associate Professor; Department of Building Services Engineering; Hong Kong Polytechnic University; Hung Hom, Kowloon, Hong Kong; [joseph.lai@polyu.edu.hk](mailto:joseph.lai@polyu.edu.hk).

## 1. Introduction

Post-occupancy evaluation (POE) is the process of evaluating buildings in a systematic and rigorous manner after they have been built and occupied for some time (Preiser, 1989). In order to evaluate the performance of existing facilities in a building, a POE is usually needed. Results obtained from a POE will inform how well the building matches its user needs, and reveals ways for improving any design, construction and performance of its built facilities.

POE studies, particularly those on student hostels, have been growing across the world. For instance, Hassanain (2008) conducted a POE study to investigate the major technical and functional elements of performance of the facilities in a student housing in Saudi Arabia. Adewunmi et al. (2011) carried out a POE study on the facilities of a postgraduate hostel in Nigeria. In Malaysia, Najib et al. (2011) completed a POE study which identified the level of student satisfaction with campus student housing facilities.

In Hong Kong, the new 4-year university curriculum, which supersedes the original 3-year curriculum, has been implemented since September 2012. This change has led to an increasing number of university students and hence a rising demand of hostel facilities for the higher education institutes. The Hong Kong Polytechnic University serves as an example. In addition to the existing Halls of Residence (i.e. the Hunghom Halls), a new Halls of Residence (Homantin Halls) has been completed for occupation in 2012. Yet a search from the open literature could hardly find any recent research findings on university hostel facilities in Hong Kong. Therefore, it is not known whether the performance of the facilities in the existing hostels is satisfactory.

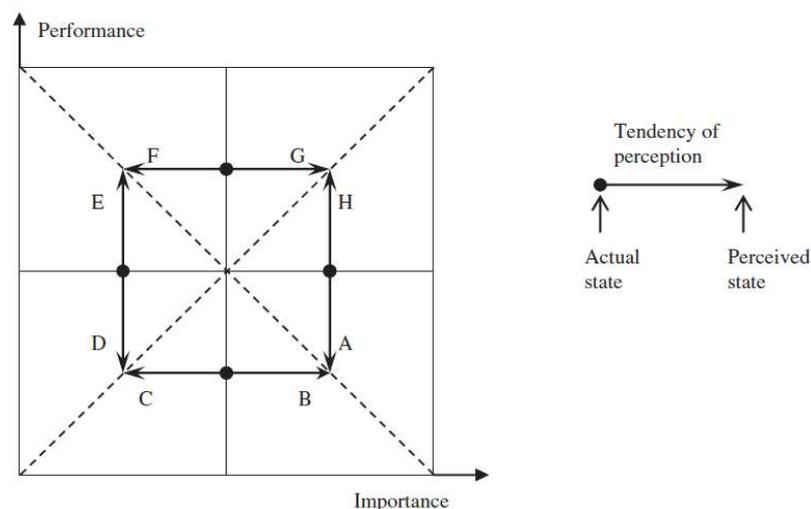
In order to investigate the performance of the facilities in the hostels, a POE study was conducted on a typical university student hostel. In the following, a review of some previous POE research models is given and the formation of a research model for the present study is outlined. The major characteristics of the hostel and the design of the questionnaire used for collecting data from the hostel's end users are described in the next section. Then the data analyses, including those made on the demography of the interviewed end users, the levels of their expectation of and satisfaction with the hostel facilities, as well as their perceived levels of importance of the facilities, are reported. The final section covers the conclusions drawn from the findings and the future work required.

## 2. Research model

The model based on which a POE should be performed may vary from one case to another, depending on the circumstances. As reviewed before (Carpenter et al., 1995), there are various POE models, e.g. the Merri Model (Merri Inc., 1993), the Performance-Based POE Model (Preiser, 1989), the System of Building and People (Markus, 1972), and so on. According to the life-cycle facility evaluation (LiFE) continuum (Carpenter et al., 1995), there are four facility performance categories in relation to occupancy: (1) physical system; (2) environmental quality; (3) functional system; and (4) behavior factors. Under each of these categories, there are multiple elements of performance.

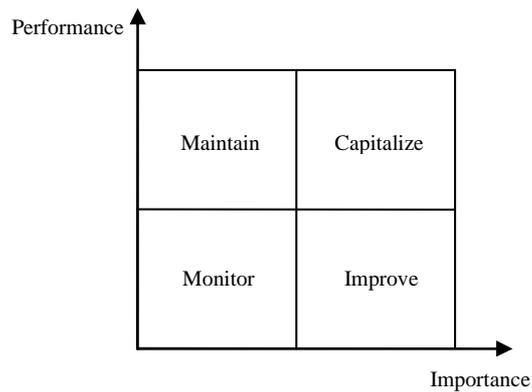
Generally, the quality of a service involves a comparison of expected performance of the service and its actual performance (Gronroos, 1978). Parasuraman et al. (1988) developed the SERVQUAL model to enable evaluation of customers' expectation of the quality of a service and their perception of the service's actual performance. Along this line, the performance of facilities in a hostel can be assessed by detecting any gap between the end users' expected level of performance of the facilities and their level of satisfaction with the facilities' performance.

In an earlier study (Lai and Yik, 2007), it was found that factors such as gender and duration of stay of building end users affect their perceived importance of various indoor environmental qualities of commercial buildings. Similarly, this kind of findings was observed in another study (Lai and Yik, 2009) which, based on a conceptual framework of tendencies of perceptions (Figure 1), investigated the users' perceptions of importance and performance of the environmental qualities of residential buildings. These studies illustrated that by using the analytic hierarchy process (AHP) of Saaty (1980) to analyze the users' perceived relative importance between pairs of environmental quality attributes, their orders of importance and performance can be determined. According to the evaluation framework of Lai (2010), the importance and performance of facilities in buildings can be further analyzed using the matrix in Figure 2 to determine which aspect of facilities should be monitored, maintained, improved or capitalized.



- A: Perceived low performance due to high expectation commensurate with perceived high importance
- B: Perceived high importance due to dissatisfaction with poor performance
- C: Perceived low importance due to adaptation to poor performance
- D: Perceived low performance due to lack of attention given rise by perceived low importance
- E: Perceived high performance due to low expectation commensurate with perceived low importance
- F: Perceived low importance with good performance taken for granted
- G: Perceived high importance due to fear of poor performance (despite the already good performance perceived)
- H: Perceived high performance relative to low performance experienced in other situations (while understanding the importance of the attribute)

**Figure 1: Tendencies of perception and perceptions of importance and performance**

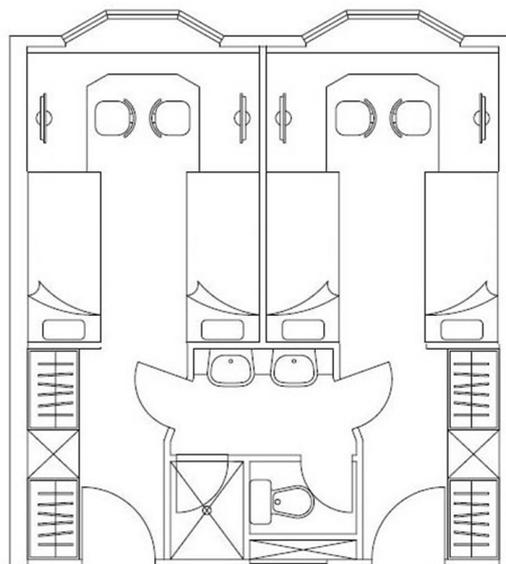


**Figure 2: Importance-performance evaluation matrix**

Based on the above, information about the studied hostel was gathered and a questionnaire was designed to collect data from its end users.

### 3. The hostel and data collection

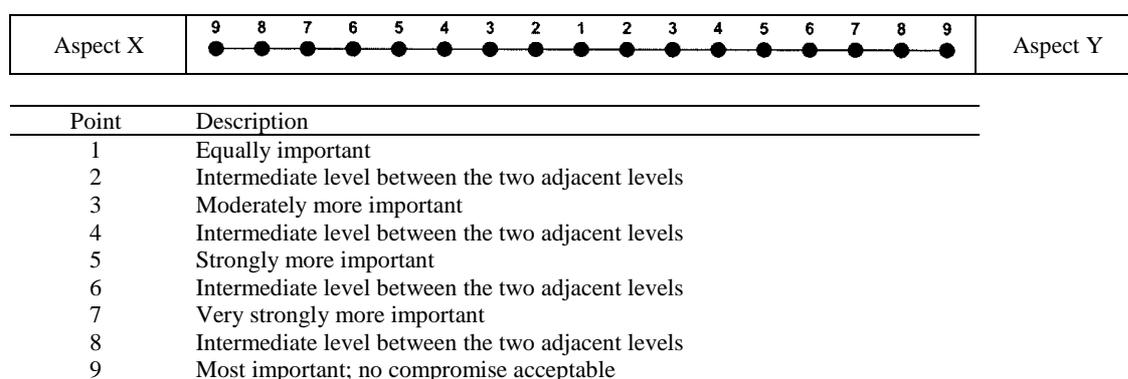
Housing over 3,000 boarders, the hostel has been occupied for 9 years. It is 22-storey high, with its majority (3-20/F) being student accommodations, and the remaining floors include: 21-22/F for warden suites and staff quarters; 2/F for function rooms; 1/F for dining hall; and G/F for reception and lobbies. There are three types of rooms for the boarders, namely A: double room in a conventional 4-person-suite; B: double room in a 5-person-suite, and C: triple room in a 5-person-suite. An example floor plan of room type A is shown in [Figure 3](#).



**Figure 3: Typical layout plan of a 4-person-suite**

A walk-through visit was paid to the hostel to obtain an overview of the facilities there. A focus group consisting of five users of the hostel was then formed to discuss on the facilities affecting their living and activities in the hostel. The main aspects of such facilities were found to be: lighting, air-conditioning, fire safety, acoustic, internet, and hygiene.

A questionnaire comprising three sections was designed to collect data from the hostel's end users. The first section enquired into the demographic information of the respondents. The second section asked the respondents to indicate, based on a 7-point scale (1: lowest to 7: highest), their expectation and satisfaction levels of performance of the six facilities aspects in their accommodations. In the final section, the respondents were requested to make a series of comparisons between pairs of the aspects based on the same 9-point scale (Figure 4) adopted in an earlier study on residential buildings (Lai, 2012).



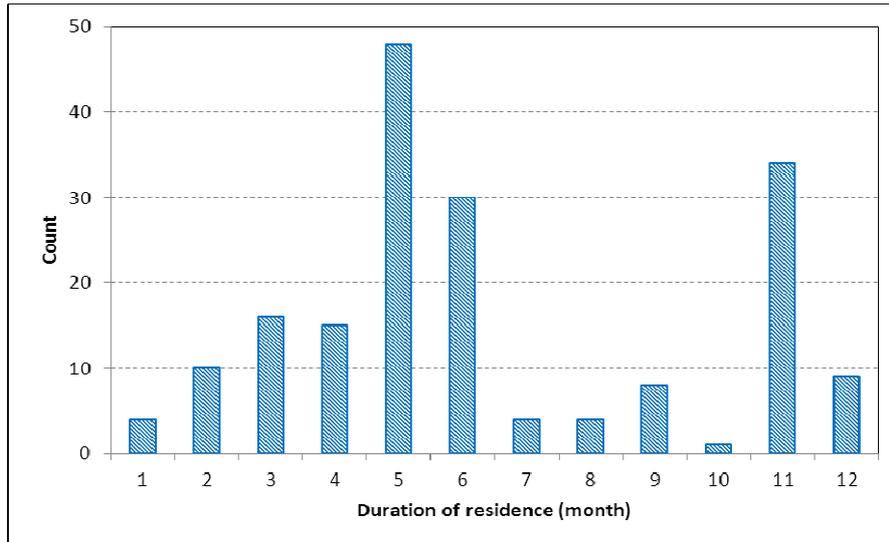
**Figure 4: The 9-point scale for pair-wise comparisons**

The questionnaire was used in face-to-face interviews with the end users, who were invited to participate in the study on a voluntary basis. In total, 204 interviews were completed and the collected data were analyzed.

## 4. Analysis and discussion of findings

### 4.1 The interviewees

There were 101 female and 103 male among the interviewees. The vast majority (94.6%) of them were regular residents of the hostel although their residence durations varied from 1 to 12 months, with the majority having lived there for 5 months (Figure 5). The proportions of the interviewees staying in room types A, B and C were 47.5%, 31.4% and 21.1%, respectively.



**Figure 5: Residence durations of the interviewees**

## 4.2 Expectation of and satisfaction with the facilities

The responses given by the interviewees to the second section of the questionnaire were taken to figure out the key statistical values - minimum, maximum, mean, and standard deviation (S.D.) (Table 1). Among the six main facilities aspects, air-conditioning was given the highest mean level of expectation (4.99), showing that the end users desired this aspect to outperform the remaining aspects. The aspect with a lower level of expectation was internet (4.65), followed by lighting (4.47), acoustic (4.17), hygiene (3.95), and fire safety (3.79).

**Table 1: Levels of expectation and satisfaction**

Aspect	Expectation				Satisfaction				Gap
	Min.	Max.	Mean	S.D.	Min.	Max.	Mean	S.D.	
Lighting	1	7	4.47	1.25	2	7	5.13	1.24	+0.66
Air-conditioning	1	7	4.99	1.14	1	7	3.56	1.40	-1.43
Fire safety	1	7	3.79	1.48	1	7	4.80	1.40	+1.01
Acoustic	1	7	4.17	1.46	1	7	3.30	1.32	-0.87
Internet	1	7	4.65	1.46	1	7	3.04	1.37	-1.61
Hygiene	1	7	3.95	1.27	1	7	3.86	1.39	-0.09

The lighting aspect, the mean expectation level of which being 4.47, was most satisfied by the end users. While fire safety was given the lowest level of expectation, its level of satisfaction (4.80) was only second to that of the lighting aspect. The hygiene aspect, with a satisfaction level of 3.86, ranked third. Apart from this aspect which was perceived by the end users as lower than the neutral satisfaction level (rating being 4), the remaining aspects falling within this category, in descending order of satisfaction levels, were: air-conditioning (3.56), acoustic (3.30), and internet (3.04).

Analyzing only the expectation levels or satisfaction levels of the facilities aspects, however, could not inform whether or not their actual performance were able to meet with the end users' expectations. The differences between the calculated mean satisfaction levels and mean expectation levels of the various aspects revealed that the lighting and fire safety aspects, both with a positive gap value, were able to satisfy the end users' expectation. Nevertheless, the gap values of the remaining four aspects were all negative, meaning that their performance levels failed to meet the levels that the end users expected.

The mean levels of expectation of the various aspects of facilities drawn from the female and male respondents were computed. Similarly, the counterparts of the satisfaction levels were obtained. Based on such mean expectation and satisfaction ratings (Table 2), the corresponding rank orders were determined, which show that the air-conditioning aspect recorded the highest order of expectation from both the female and male subgroups. While the hygiene aspect ranked bottom according to the male respondents, the female subgroup expected its performance to be higher than that of the acoustic and fire safety aspects.

**Table 2: Mean expectation and satisfaction ratings of the female and male subgroups**

Aspect	Expectation		Satisfaction	
	Male	Female	Male	Female
Lighting	4.544 (3)	4.396 (3)	5.243 (1)	5.010 (1)
Air-conditioning	4.961 (1)	5.020 (1)	3.476 (4)	3.653 (4)
Fire safety	3.816 (5)	3.762 (6)	4.709 (2)	4.901 (2)
Acoustic	4.252 (4)	4.089 (5)	3.320 (5)	3.277 (5)
Internet	4.835 (2)	4.465 (2)	2.893 (6)	3.198 (6)
Hygiene	3.786 (6)	4.119 (4)	3.951 (3)	3.772 (3)

Note: Rank orders are in parentheses.

Referring to the results pertaining to perceived satisfaction levels, it was found that the rank orders across all the rated aspects were identical between the female and male subgroups. This indicates the existence of perfect positive correlation between the subgroups of satisfaction ranks. On the other hand, the rank orders of expectation of the two subgroups were not identical. The Spearman rank correlation coefficient (range: -1 to +1) calculated based on these rank orders was found to be 0.829, indicating the existence of a strong but imperfect positive correlation.

### 4.3 Importance of the facilities aspects

Under the final section of the questionnaire, the interviewees were asked to make comparisons on the importance they perceived between each pair of the facilities aspects. Given that there were six such aspects, each interviewee had to make  ${}_6C_2$  (i.e. 15) pairwise comparisons. The response given by each interviewee was processed by the AHP method to give the importance levels they perceived for each of the six aspects. Statistics of the calculated AHP weights, including the minimum, maximum, S.D. and mean values, are shown in Table 3. Also listed in the same table are the importance ranks of the aspects, which were determined with respect to their mean importance weights.

**Table 3: Statistics of importance (AHP) weights**

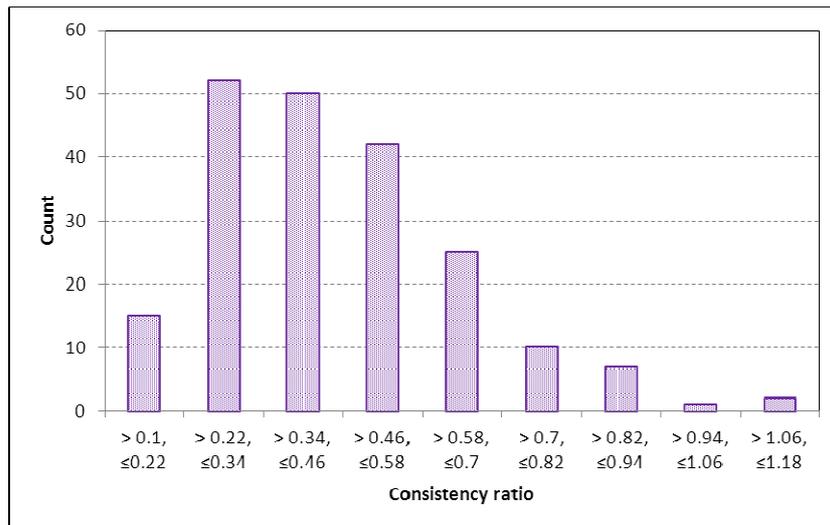
	Min.	Max.	S.D.	Mean	Rank
Lighting	0.029	0.414	0.068	0.180	2
Air-conditioning	0.053	0.457	0.076	0.231	1
Fire safety	0.030	0.377	0.055	0.145	5
Acoustic	0.026	0.321	0.060	0.160	3
Internet	0.029	0.274	0.061	0.129	6
Hygiene	0.042	0.316	0.052	0.154	4

Inspections across the minimum values of the importance weights found that they were of the same order of magnitude, and a similar observation was noted from the maximum values. Among the standard deviation values, the one pertaining to the air-conditioning aspect (0.076) was the highest, indicating the widest spread of its importance weight values. On the other hand, the spread of the importance weight values of the hygiene aspect was the smallest given that its standard deviation was the least (0.052).

As the total AHP weight of all the rated aspects is unity (1.000), the nominal weight of each of the six aspects is 1/6, or 0.167. The calculated mean importance weights show that the perceived importance levels of the air-conditioning and lighting aspects were higher than the nominal level. The greatest importance weight of the air-conditioning aspect reflects that the air-conditioning facilities were dominant elements affecting the end users' perceptions. The importance levels of the remaining four aspects, ranging between 0.129 and 0.160, were lower than the nominal importance level.

Whereas the above results have informed the levels of importance of the various aspects of facilities, the credibility of these findings depends on whether or not the pairwise comparisons made by the interviewees were made from consistent judgments. In order to determine such consistency, the consistency ratio of each interviewee's response was computed following the same process used in the study of [Lai and Yik \(2009\)](#). The distribution of the calculated consistency ratios is displayed in [Figure 6](#).

The majority of the consistency ratios lied in the range of 0.22-0.34 and the mean value was 0.4494. According to [Saaty \(1995\)](#), the consistency ratio of responses made from consistent judgments should not exceed 10%. But the smallest consistency ratio was found to be 0.1202, meaning that none of the responses was made from consistent judgments. Although the analysis thus far is unable to explain the cause for this finding, the fact that the interviewees had to make 15 pairwise comparisons on the importance levels of the six facilities aspects is a factor that probably contributed to the inconsistent judgments. In the study of [Lai and Yik \(2009\)](#) where six pairwise comparisons were made for four attributes under study, 33% of the responses were made from consistent judgments. A lower proportion (31%) of consistent judgments was obtained in another study ([Lai, 2011](#)) where the respondents had to make 10 pairwise comparisons for five attributes.



**Figure 6: Distribution of consistency ratios**

## 5. Conclusions

The POE study, focusing on a typical university student hostel in Hong Kong, was carried out based on a research model incorporating the SERVQUAL model of [Parasuraman et al. \(1988\)](#) and the performance-importance model of [Lai and Yik \(2007; 2009\)](#). The six main aspects of facilities affecting the living and enjoyment of the boarders, as identified from the focus group discussion, were: lighting, air-conditioning, fire safety, acoustic, internet, and hygiene. By interviewing the end users of the hostel, their perceived expectation of, satisfaction with and importance of these aspects of facilities were solicited.

While air-conditioning recorded the highest mean level of expectation, the end users indicated their lowest satisfaction with this aspect of facilities. The evaluation so far, however, was not able to inform the root cause of this finding. The users' qualitative comments on the performance of the air-conditioning facilities need to be analysed in future in order to identify what improvements are required for such facilities.

Lighting and fire safety were the only two aspects which were given a satisfaction level higher than the respective expectation level. In other words, the performances of the other four aspects of facilities have yet to be improved in order to meet with the expectation of the end users. Although the analysis of the responses given by the male and female users revealed that gender was not a significant factor affecting the rank orders of satisfaction with the facilities, whether other factors such as residence duration, room capacity, level and orientation, etc. would have influence on the end users' perception of the facilities' performance should warrant further investigation.

Using the AHP method, the importance levels of the six aspects of facilities were determined, with air-conditioning bearing the highest importance. In contrast, internet facilities were perceived as the least important. Examination of the consistency ratios of the responses unveiled that the judgments given by the interviewees for the pairwise comparisons between the various facilities aspects were not of good consistency. While it

may be ascribed to the large number of comparisons the interviewees had to make, further work is needed to find ways to tackle this problem.

## Acknowledgement

The study reported above was supported by a research grant (No. G-YL16) of The Hong Kong Polytechnic University.

## References

Adewunmi Y, Omirin M and Famuyiwa F (2011) "Post-occupancy evaluation of postgraduate hostel facilities" *Facilities* **29**(3/4): 149-168.

Carpenter C L and Oloufa A A (1995) "Postoccupancy evaluation of buildings and development of facility performance criteria" *Journal of Architectural Engineering* **1**(2): 77-81.

Gronroos C (1978) "A Service-Oriented Approach to Marketing of Service" *European Journal of Marketing* **12**(8): 588-601.

Hassanain M A (2008) "On the performance evaluation of sustainable student housing facilities" *Journal of Facilities Management* **6**(3): 212-225.

Lai J H K and Yik F W H (2007) "Perceived Importance of the Quality of the Indoor Environment in Commercial Buildings" *Indoor and Built Environment* **16**(4): 311-321.

Lai J H K and Yik F W H (2009) "Perception of Importance and Performance of the Indoor Environmental Quality of High-Rise Residential Buildings" *Building and Environment* **44**(22): 352-360.

Lai J H K (2010) "Investigating the quality of FM services in residential buildings, Proceedings: W070 - Special Track", *18th CIB World Building Congress (CIB Publication 343)*, 10-13 May, Salford UK, 13-25.

Lai J H K (2011) "Comparative evaluation of facility management services for housing estates" *Habitat International* **35**(2): 391-397.

Lai J H K (2012) "Analytical Assessment and Comparison of Facilities Management Services for Residential Estates" *International Journal of Strategic Property Management* **16**(3): 236-253.

Markus T (1972) *Building performance*, New York, N.Y., John Wiley & Sons.

Merri Inc. (1993) A framework for assessing sustainable environmental development practices, Report written for the United States Environmental Protection Agency, Washington, D.C.

Najib N U M, Yusof N A and Abidin N Z (2011) "Student residential satisfaction in research universities" *Journal of Facilities Management* **9**(3): 200-212.

Parasuraman A, Zeithaml V A and Berry L L (1988), "SERVQUAL: A multiple-item scale for measuring consumer perceptions of service quality" *Journal of Retailing* **64**(1): 12-40.

Preiser W F E (1989) Towards a performance-based conceptual framework for systematic POEs. In: Preiser W F E, (ed.) *Building evaluation*, New York, N.Y.: Plenum Press.

Saaty T L (1980) *The Analytic Hierarchy Process: Planning, Priority Setting, Resource Allocation*, McGraw-Hill.

Saaty T L (1995) *Decision Making for Leaders: The Analytic Hierarchy Process for Decisions in a Complex World*, RWS Publications.