

Influence of Personal Attributes on Perception of Residential Facilities Management Services

Structured abstract

Purpose

The study aimed to explore the influence of personal attributes, namely gender, age, education and income, on perception of facilities management (FM) services for residential buildings.

Methodology/approach

Collected through an interview survey, the personal particulars of the users of a typical residential estate in Hong Kong and their perceived importance and performance levels of five main aspects of FM services were analyzed using the analytic hierarchy process (AHP) and statistical analyses.

Findings

The weighted performance ratings of the services, which are products of interaction between perceived importance and perceived performance, showed perfect rank correlations across user groups with different personal attributes. As for the shares contributed to the services' overall weighted performance, the largest differences were associated with the security and leisure and landscape aspects rated between the users with tertiary education and those without.

Research implications

The findings that male adults, users with tertiary education and those with earning capacity tended to give more consistent responses can serve as a reference for determining the target amount of samples in similar surveys in future. Further work is needed to research into how the method of this study may be adapted for use in investigating FM services for other types of buildings or the same type of buildings in other places.

Practical implications

The approach taken in scrutinizing the performance contributions of the services, which helps identify any improvements needed, can be used to evaluate FM services for similar residential buildings.

Originality/value

The study results provide an understanding of the influence of personal attributes on perception of FM services.

Paper type

Research paper

Influence of Personal Attributes on Perception of Residential Facilities Management Services

Introduction

In densely populated places, most residential buildings are multi-storey buildings occupied by multiple owners or tenants. The communal areas of these buildings, such as corridors, foyers, staircases, roofs, and open spaces (gardens, pavements, podiums, etc.) and the installations there (e.g. lifts, lighting, drainage, fire services) are shared for use by the end users. To ensure that such facilities perform to the satisfaction of the users, quality management services are needed.

Hong Kong, a metropolis with a dense built environment, accommodates over seven million people. The bulk of its residential flats, according to the statistics of the Hong Kong Housing Authority ([HA, 2009](#)) and the Rating and Valuation Department ([RVD, 2010](#)), exceeded 2.2 million units. Proper upkeep of the facilities serving these accommodations, which is indispensable for ensuring the basic health and safety of their end users, are governed by a range of statutory requirements ([Lai and Yik, 2004](#)). Yet, the conditions of the facilities beyond the statutory baseline are largely attributed to differences in their management systems ([Ho et al., 2008](#)).

Realising the increasing need of proper management for facilities in buildings, the government has launched a consultation to solicit the views of the public on putting in place a regulatory framework for the property management industry, the scope of which covers mandatory licensing for companies providing management services for residential properties and facilities ([HAD, 2010](#)). While the purpose of this proposed legislation is to set a

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minimum acceptable standard with which the provision of FM services has to comply, the actual performance of the services, in any case, needs to be identified in order to evaluate their effectiveness.

In a recent research on the quality of FM services ([Lai, 2010](#)), an analytical method has been developed for evaluation of the services perceived by residential users. The method, as [Lai and Yik \(2011\)](#) have illustrated, is able to process the users' responses to distinguish which among them are drawn from inconsistent judgments or consistent judgments. Based on the latter type of judgments, a weighted performance score can be calculated for representing the overall quality of a residential FM service. Subsequently, the method was extended for application in a study which compares the performances of FM services between two residential estates with comparable characteristics ([Lai, 2011](#)). These previous research works, however, were not intended to find out what factors may affect the perception of the services.

In fact, the influence of five parameters on overall satisfaction of dwellers in Bangkok (Thailand), namely neighbours, public facilities, environmental conditions, dwelling units and location aspects, were examined by [Savasdisara, Tips, and Suwannodom \(1989\)](#). In Kuala Lumpur (Malaysia), the residential satisfaction of housing dwellers was assessed with respect to a range of variables, which were grouped into five components - dwelling unit features, dwelling unit support services, public facilities, social environment and neighbourhood facilities ([Mohit, Ibrahim, and Rashid, 2010](#)). In Hong Kong, [Hui \(2005\)](#) studied the key success factors of residential building management based on some interviews with the management committees of three residential estates. The study of [Hui and Zheng](#)

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(2010), through a survey of residential customers, identified the crucial variables of customer satisfaction towards FM service.

Apart from the factors investigated in the above studies, the endogenous factors of the residential users that may affect their perception of the services were seldom examined. Therefore, a study has been carried out to explore the influence of the users' personal attributes on their perception of FM services. The method of the study, which included an interview survey of the users of a typical residential estate in Hong Kong, is described in the following section. Then, the data collection process and the procedures taken for selecting quality responses from the collected samples are reported. The perceived importance and performance levels of the FM services, computed with the aid of the analytic hierarchy process (AHP), were analyzed with respect to different personal attributes of the users. Further to discussing the analyzed findings, the conclusions drawn are given at the end.

Method and Data

Among the numerous residential estates in Hong Kong, the one selected for this study satisfied the following criteria. First, the scale of the estate was within the typical range which covers a large number of similar estates. Second, the estate had been occupied for a considerable period and its facilities had been provided with recurrent management services so that the users would be able to confidently indicate their perception about the services. Third, the open spaces of the estate were not restricted from access, allowing interviews to be made with the users.

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As identified earlier in the studies of Lai (2010; 2011), residential FM services generally cover five main aspects, namely security (SEC), cleaning (CLN), repair and maintenance (R&M), landscape and leisure (L&L), and general management (GEN). Examples of their major elements include: a) SEC – performance of security staff, passage control, security patrol; b) CLN – performance of cleaners, cleanliness of common areas, waste collection and removal; c) R&M – performance of technicians, condition of building fabric and functioning of engineering services; d) L&L – performance of gardeners, pest control, condition of recreational facilities; and e) GEN – performance of management staff, arrangement of estate activities. To find out the levels of resources deployed for these services, the annual expenditure account of the estate was obtained from the estate's management office.

Referring to the objective of the study, the personal attributes included in the investigation were: gender, age, education and income levels. The first two of these endogenous attributes, which are commonly investigated in human perception studies, were expected to have influence on the residential users' perception of FM services. Users with a higher education level should be able to earn more from their work. Suspecting that such users would look for a better quality of FM services for their living environment, education and income levels were two other factors covered in the study. On this basis and taking into account the preceding categorization of FM services, a questionnaire following the format of that used in an earlier study (Lai, 2011) was designed for use in structured interviews with the users of the estate. Under the first section of the questionnaire, the interviewees were asked about their personal attributes. The questions in the second section requested the interviewees to indicate their perceived performance levels of the five aspects of services using a 5-point scale (1: very poor; 2: poor; 3: fair; 4: good; 5: excellent). In the final section, the questions for soliciting the users' perceived relative importance between pairs of the five aspects were

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designed based on a 9-point scale (Table 1), which had been proved useful in studying the perception of indoor environmental quality of residential buildings (Lai and Yik, 2009). The meaning of this scale was explained to the interviewees so as to ensure their understanding before they answered the relevant questions.

“Take in Table 1”

For consistency sake, all the interviews were conducted by the same team of trained interviewers, and pilot interviews were carried out to test the validity and effectiveness of the questionnaire before the survey was proceeded in full swing. The span of the survey period was four weeks and among the users approached on a random basis at the estate’s open spaces, 294 accepted to voluntarily participate in the interviews and their responses were recorded at the spot.

Analysis and Discussion

Characteristics of the estate and the users

At the time of the survey, the estate had been occupied for eight years. Comprising 12 building blocks each of 22 to 30 storeys high, the estate accommodated a total of 3,000 households, with an overall gross floor area of more than 177,000 m². On each typical floor of the buildings, there were 10 residential units, which ranged between 46 and 64 m² in size.

From the estate’s expenditure account, it was found that the total cost of FM services provided for the communal facilities was over HK\$18 million a year, or HK\$8.5/m² a month

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(US\$1 = HK\$7.8). The shares between the five aspects of services, in descending order, were: 36.3% (R&M), 29.2% (GEN), 24.3% (SEC), 9.1% (CLN), and 1.1% (L&L).

Regarding the interviewees, the proportion of female (59.2%) was more than the male counterpart (40.8%). The majority (77.2%) were adults aged between 18 and 60, and the rest were minors (18.0%) and elderly (4.8%). When grouped by their education levels, over half (58.2%) were secondary school graduates, 28.2% had tertiary qualifications, 12.2% had only completed primary studies, and the remaining 1.4% had not received any formal education. On the whole, the interviewees belonged to the medium- to low-income class: only 1.0% earned more than HK\$50,000; most had a monthly income of not more than HK\$20,000 (42.6%) or even no income (41.8%). The living of those without earning capacity relied on financial supports such as those given by their dependants or some social security assistance schemes.

Since personal perception may be influenced by the halo effect ([Nisbett and Wilson, 1977](#)), which is a cognitive bias whereby the perception of one trait is affected by the perception of another trait (or several traits), the collected responses were checked to detect if such an effect had distorted their consistency. For this purpose, a computer program that utilizes the EVCRG standard subroutine (available from the well-established International Mathematical and Statistical Library) for eigenvalue and eigenvector calculations was used to compute the importance weights based on the pair-wise relative importance ratings given by the interviewees, and the steps of this consistency test were similar to those taken in the study of [Lai and Yik \(2011\)](#). First, each set of the relative importance ratings was organised to form a 5x5 comparison matrix. Second, the matrix data were input to the computer program for: i) evaluating the principal eigenvalue and eigenvector; ii) computing the consistency ratio (*CR*);

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and iii) normalizing the elements in the principal eigenvector to yield the importance weights.

Finally, the *CR* of each data set, which was calculated by Equation (1) where λ_p is principal eigenvalue, N is number of rated items, and RC is random consistency, was checked against the limit for a 5x5 matrix.

$$CR = \frac{\lambda_p - N}{N - 1} \times \frac{1}{RC} \quad (1)$$

For pair-wise comparisons involving the use of a 5x5 comparison matrix, the value of RC is 1.11 and the *CR* limit is 10% (Saaty, 1995). Data sets with *CR* values exceeding this limit were treated as involving inconsistent judgments. Among all the responses, 83 of them with a mean *CR* of 0.0418 (standard deviation (*S.D.*) being 0.0358) were obtained from consistent judgments, resulting in a usable sample rate of 28.2%, which is slightly below that (31.1%) of a similar study (Lai, 2011).

The amounts of collected and usable samples, proportion of usable samples, and *CR* values (mean and *S.D.*) grouped according to the four kinds of personal attributes were calculated. As compared to the working adults, those aged below 18 (students) and the elderly people aged above 60 (retirees) spent more of their time in the estate, so they were grouped together. With higher education as a demarcation line, 37.4% of the usable samples were drawn from those in the tertiary group. A comparable proportion of the usable samples is associated with those with no income. In interpreting these statistics (Table 2), note should be taken that the two subgroups under the same category are mutually exclusive samples. Direct comparisons can thus be made between such subgroups, but not between those under different categories.

“Take in Table 2”

Across the various subgroups, the proportions of usable samples are comparable, with the highest three corresponding to the males, users aged between 18 and 60, and those with tertiary education. The usable rate of the latter is at the top (37.3%) and its mean *CR* value is the smallest. These observations imply that those with a higher education level tended to give more consistent judgments on the relative importance between pairs of the rated aspects. Nevertheless, the smallest *S.D.* value of *CR* was found with the subgroup embracing the minors and the elderly, meaning that the spread of their *CR* values was the narrowest. In the following, only those samples that were able to pass the foregoing consistency test (i.e. the quality and reliable perception responses) were analysed.

Importance and performance of the services

Apart from computing the consistency ratio for each data set, the above-mentioned computer program generated the perceived importance values (AHP weights) for each service aspect based on the relative importance ratings given by each interviewee. Averaging such importance weights given by the i^{th} respondent for the a^{th} aspect ($W_{i,a}$) yielded the mean importance weight of the a^{th} aspect ($\bar{W}_a$), where a equals 1: SEC, 2: CLN, 3: R&M, 4: L&L, or 5: GEN; n is number of respondents (see [Equation 2](#)).

$$\bar{W}_a = \frac{\sum_{i=1}^n W_{i,a}}{n} \quad (2)$$

$$\bar{P}_a = \frac{\sum_{i=1}^n P_{i,a}}{n} \quad (3)$$

The calculated mean importance weights and their rank orders grouped with respect to the gender, age range, and education and income levels of the interviewees are shown in Table 3. Also summarised in this table are the mean performance ratings of the five aspects, each of which ($\bar{P}_a$) was calculated by Equation 3, where $P_{i,a}$ is the performance rating given by the i^{th} respondent for the a^{th} aspect.

“Take in Table 3”

As far as importance of the services is concerned, security outweighs the other four aspects. This finding applies to the perceptions of all subgroups, of which the importance weights, ranging between 0.2595 and 0.3425, are significantly above the nominal importance weight. Note that the total sum of AHP weights of the rated aspects is 1.0 and given that five aspects were rated, an aspect with nominal importance carries a weight of 0.2.

The importance weights of the cleaning service perceived by the various subgroups are all above the nominal value. This kind of service was considered by all but not the male subgroup as the second most important aspect. The male users perceived that instead of the cleaning service, the repair and maintenance service was more important. Possible reasons for these findings, for example, include: i) the female users, as compared to the males, were more concerned about the cleanliness of facilities; and ii) the male users usually dealt with maintenance problems and thus they regarded the repair and maintenance service as more important. Nevertheless, verification of these suggested reasons was beyond the scope of the study.

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The remaining two aspects, namely leisure and landscape and general management, were rated by all subgroups as below the nominal importance level. The rank of the former aspect, in line with its smallest expenditure among the five aspects, is the lowest across the subgroups. The fact that the provision of leisure and landscape facilities for the estate was minimal should have contributed to this finding.

Referring to the mean performance ratings of the subgroups, it appears that all the services were perceived by the users as between the levels of fair (3) and good (4). Unlike the rather regular orders found with the importance counterparts, the rank orders of the performance ratings varied largely from one subgroup to another. For instance, the performance of the security aspect was perceived by those who were not working (i.e. no income) as the highest whereas those with earning capacity considered the performance of the general management aspect as the best. The same observation between the non-tertiary and tertiary subgroups is noted.

In general, the security and cleaning services were perceived as of relatively good performance. This is supported by the finding that their ranks across the subgroups were among the top three positions. On the other hand, the leisure and landscape aspect recorded the lowest performance rank across the board, indicating that its performance was inferior to those of the other four aspects.

In order to identify if there exists any correlation between the rank orders of the importance and performance levels perceived between pairs of the subgroups, Spearman rank correlation coefficients (r_s) were computed by using the SPSS software. The results, as summarised in [Table 4](#), show perfect positive correlations ($r_s = 1.000$) between the importance ranks rated

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by all pairs of subgroups except that the correlation between the first pair, i.e. male and female, is slightly less than perfect.

“Take in Table 4”

With regard to perceived performance, the calculated correlation coefficients indicate that no significant correlation exists between the rank orders of any pair of the subgroups. The weakest correlation ($r_s = 0.103$) is associated with the pair of those with incomes and those without.

Weighted performance of the services

In an earlier study on the perception of importance and performance of indoor environmental quality (Lai and Yik, 2009), it has been shown that the performance level of an element that a person perceived can be influenced by the perceived importance level of the same element. The product of interaction between the mean levels of these two parameters of the a^{th} aspect, denoted as weighted mean performance rating ($\hat{P}_a$), was computed by Equation (4).

$$\hat{P}_a = \bar{W}_a \times \bar{P}_a \quad (4)$$

$$\hat{P}_{i,a} = P_{i,a} \times W_{i,a} \quad (5)$$

$$\hat{P}_{i,o} = \frac{1}{N} \sum_{a=1}^N P_{i,a} \times W_{i,a} \quad (6)$$

Table 5 summarises the weighted mean performance ratings of the five aspects and the orders of their values in each subgroup. Unlike the results pertaining to the importance weights and

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performance ratings (Table 3), the rank orders determined based on the weighted ratings are identical across all four pairs of subgroups, with security being at the top, followed by cleaning, repair and maintenance, general management, and leisure and landscape. In other words, there are perfect agreements between the orders of weighted performance levels perceived by all pairs of the subgroups.

“Take in Table 5”

In order to enable more detailed investigations into the service levels perceived by individual users, their weighted performance ratings of each aspect ($\hat{P}_{i,a}$) were calculated using Equation (5). In addition, the individuals' overall weighted performance ratings ($\hat{P}_{i,o}$) were obtained by averaging the sum of their weighted performance ratings of the five aspects (Equation (6)). The weighted performance and overall weighted performance ratings calculated in this way were used as testing parameters for identifying if there is any difference between the weighted performance levels of subgroups of users. The population means of such parameters are defined as follows:

μ_1 = mean weighted (or overall weighted) performance rating of subgroup A

μ_2 = mean weighted (or overall weighted) performance rating of subgroup B

Assuming that no difference exists in the weighted (or overall weighted) performance of the services perceived by the subgroups, the null hypothesis (H_0) and alternative hypothesis (H_1) can be written as:

$$H_0 : \mu_1 - \mu_2 = 0$$

$$H_1 : \mu_1 - \mu_2 \neq 0$$

The above hypotheses were tested by a two-tailed z -test for subgroups with large samples ($n \geq 30$) and a two-tailed t -test where the sample is small ($n < 30$). For a 95% confidence interval estimate of the difference between two population means (i.e. $\alpha = 0.05$), the critical value for z -test is 1.96, and that for t -test involving a small sample of users (age <18 or >60) is 1.99.

Inspections made on the p values obtained based on the overall weighted performance ratings of the subgroups revealed that all of them, which range between 0.6005 and 0.8022 (Table 6), are greater than $\alpha = 0.05$. Thus, H_0 is not rejected, and it can be concluded that the population means (μ_1 and μ_2) are equal, i.e. the overall weighted performance levels of the services perceived between pairs of the subgroups were not different.

“Take in Table 6”

Further inspections were made on the statistical results of individual aspects of the services. The p value for the comparison between the tertiary and non-tertiary subgroups under the security aspect is 0.0134, which is smaller than α . This shows that it is not in the rejection region and hence the population means of these two subgroups are not equal. Under the same aspect, the p values of the remaining pairs of subgroups (in terms of gender, age, and income) lie between 0.3086 and 0.8623, exceeding 0.05. Therefore, their respective null hypothesis is not rejected and hence their population means are equal.

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The p values across the subgroups under the subsequent three aspects, which range between 0.2684 and 0.9463 (CLN), 0.4857 and 0.7623 (R&M), and 0.1155 and 0.4934 (GEN), are all greater than α , implying that they are not in the rejection region. Therefore, the population means of each pair of subgroups under these aspects are equal, meaning that there were no significant differences between their weighted performance levels.

Under the leisure and landscape aspect, the population means of the weighted performance ratings of the first two pairs of subgroups are also equal because their p values are greater than α . The p values corresponding to the remaining two pairs of subgroups, however, are 0.0002 and 0.0270 ($< \alpha = 0.05$). This indicates the existence of unequal population means between: i) the non-tertiary and tertiary subgroups; and ii) the users with incomes and those without.

The above analyses have identified between which pairs of subgroups and under which aspects of the services the population means of the weighted performance ratings were not equal. In order to examine further the shares of contributions of different service aspects to their overall weighted performance perceived by the users, the average weighted performance rating of the a^{th} aspect of subgroup G , denoted as $\hat{P}_{G,a}$, was calculated using Equation (7), where n_G is number of samples in the subgroup. The calculated ratings of the five aspects were summed up and then divided by the number of samples (Equation (8)) to yield an average overall weighted performance rating ($\hat{P}_{G,o}$). Using Equation (9), the fraction (share) of weighted performance rating of the a^{th} aspect of each subgroup ($F_{G,a}$) was calculated.

$$\hat{P}_{G,a} = \frac{1}{n_G} \sum_{i=1}^{n_G} P_{i,a} \times W_{i,a} \quad (7)$$

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$$\hat{P}_{G,o} = \frac{1}{n_G} \sum_{a=1}^N \sum_{i=1}^{n_G} P_{i,a} \times W_{i,a} \quad (8)$$

$$F_{G,a} = \frac{\hat{P}_{G,a}}{\hat{P}_{G,o}} \quad (9)$$

The shares of weighted performance of the five service aspects are as plotted in [Figure 1](#), in which each subdivided chart shows the distributions of a pair of subgroups in each category of personal attributes (gender, age, education, and income). Common to the four charts, the largest share was contributed by the security aspect whereas the least contribution came from the leisure and landscape aspect.

“Take in Figure 1”

Concurring with the earlier observations ([Table 6](#)), the biggest differences in shares are noted between the tertiary and non-tertiary subgroups under the security aspect (7.9%) and the leisure and landscape aspect (5.2%) ([Figure 1\(c\)](#)). This implies that if more samples with a tertiary education level were included in the survey, it is likely that the weighted performance of the security aspect would be higher and that of the leisure and landscape aspect would be lower.

Instead of the difference in shares under the leisure and landscape aspect (3.3%) in [Figure 1\(d\)](#), the third largest difference in shares, being 3.5%, was found under the security aspect between two pairs of subgroups: gender ([Figure 1\(a\)](#)) and age ([Figure 1\(b\)](#)). The differences in shares between the remaining subgroups, which are all less than 3.0%, are indeed small. The counterparts corresponding to the cleaning and repair and maintenance aspects between the education subgroups, which are only 0.5%, are even negligible.

Conclusions

The performance of FM services, which is crucial to the living quality in numerous residential buildings, can be measured by the end users' perception about the services. Among the users surveyed, the proportion of usable samples, i.e. those who provided consistent judgments when rating the relative importance between pairs of the five FM aspects, was around 30%. With the users grouped according to their gender, age, education and income levels, it was found that the male adults, users with tertiary education and those with earning capacity tended to give more consistent responses. These findings can serve as a reference when it is necessary to determine the target amount of samples to be collected in similar surveys in future.

The study has revealed the influence of the users' personal attributes on their perception of the importance and performance of residential FM services. Generally the users perceived security as the most important service while the importance of management service for the leisure and landscape facilities were regarded as the lowest. The performance levels of the five aspects of services, when judged by their raw performance ratings, varied between different subgroups of the users. On the other hand, the weighted performance rating of an aspect, which integrates the interaction between its importance and performance, can represent the eventual performance perceived by the users. The rank orders of the five service aspects, when determined based on these weighted performance ratings, were in perfect agreement across all the subgroups.

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The largest differences in shares of weighted performance were associated with the security and leisure and landscape aspects rated between the users with tertiary education and those without. While the differences in the shares between the other aspects were relatively small, the approach taken in scrutinizing such differences may be used in future studies to investigate any performance gaps between different aspects of FM services in other buildings. This, in turn, can inform the relative performance contributions of the services and identify which of the services should be improved for the betterment of living quality.

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Table 1 9-point scale for rating relative importance

Point	Description
1	Equally important
2	Intermediate level between the two adjacent levels
3	Moderately more important
4	Intermediate level between the two adjacent levels
5	Strongly more important
6	Intermediate level between the two adjacent levels
7	Very strongly more important
8	Intermediate level between the two adjacent levels
9	Most important; no compromise acceptable

Table 2 Subgroups of samples and consistency ratios

Category Subgroup	Gender		Age		Education		Income	
	Male	Female	18-60	<18 or >60	Non- tertiary	Tertiary	No	Yes
No. of samples	120	174	227	67	211	83	123	171
No. of usable samples	36	47	68	15	52	31	33	50
% of usable samples	30.0	27.0	30.0	22.4	24.6	37.3	26.8	29.2
<i>CR</i> (mean)*	0.0438	0.0404	0.0416	0.0430	0.0354	0.0526	0.0458	0.0393
<i>CR</i> (<i>S.D.</i>)*	0.0335	0.0378	0.0369	0.0320	0.0362	0.0330	0.0361	0.0358

**CR* values calculated based on the usable samples.

Table 3 Importance weights and performance ratings of different subgroups

Service aspect	Importance				Performance			
	Male		Female		Male		Female	
	Mean	Rank	Mean	Rank	Mean	Rank	Mean	Rank
Security	0.3146	1	0.2720	1	3.6389	3	3.7660	1
Cleaning	0.2008	3	0.2245	2	3.6944	1	3.7234	2
Repair & maintenance	0.2015	2	0.1921	3	3.6667	2	3.5532	4
Leisure & landscape	0.1262	5	0.1412	5	3.5556	5	3.5106	5
General management	0.1569	4	0.1701	4	3.6111	4	3.6809	3
	18 - 60		<18 or >60		18 - 60		<18 or >60	
	Mean	Rank	Mean	Rank	Mean	Rank	Mean	Rank
Security	0.2862	1	0.3097	1	3.7059	2	3.7333	1
Cleaning	0.2154	2	0.2091	2	3.7353	1	3.6000	2.5
Repair & maintenance	0.1983	3	0.1866	3	3.6176	4	3.5333	4.5
Leisure & landscape	0.1338	5	0.1387	5	3.5294	5	3.5333	4.5
General management	0.1663	4	0.1559	4	3.6618	3	3.6000	2.5
	Non-tertiary		Tertiary		Non-tertiary		Tertiary	
	Mean	Rank	Mean	Rank	Mean	Rank	Mean	Rank
Security	0.2595	1	0.3425	1	3.7115	1	3.7097	3
Cleaning	0.2149	2	0.2131	2	3.6923	2	3.7419	2
Repair & maintenance	0.1936	3	0.2007	3	3.5769	3.5	3.6452	4
Leisure & landscape	0.1526	5	0.1046	5	3.5577	5	3.4839	5
General management	0.1795	4	0.1391	4	3.5769	3.5	3.7742	1
	No income		With income		No income		With income	
	Mean	Rank	Mean	Rank	Mean	Rank	Mean	Rank
Security	0.2840	1	0.2948	1	3.7879	1	3.6600	3
Cleaning	0.2192	2	0.2109	2	3.7576	2	3.6800	2
Repair & maintenance	0.1911	3	0.1996	3	3.6364	3	3.5800	4
Leisure & landscape	0.1518	5	0.1234	5	3.5758	4.5	3.5000	5
General management	0.1539	4	0.1714	4	3.5758	4.5	3.7000	1

Table 4 Rank correlations between pairs of subgroups

Pair of subgroups being analysed		Correlation coefficient	
		Importance	Performance
Male	Female	0.900*	0.500
18 – 60	<18 or >60	1.000**	0.791
Non-tertiary	Tertiary	1.000**	0.462
No income	With income	1.000**	0.103

* Significant at the 0.05 level (2-tailed); ** significant at the 0.01 level (2-tailed).

Table 5 Weighted mean performance ratings of different subgroups

Service aspect	Male		Female		18 - 60		<18 or >60	
	Rating	Rank	Rating	Rank	Rating	Rank	Rating	Rank
Security	1.145	1	1.024	1	1.061	1	1.156	1
Cleaning	0.742	2	0.836	2	0.804	2	0.753	2
Repair & maintenance	0.739	3	0.683	3	0.717	3	0.659	3
Leisure & landscape	0.449	5	0.496	5	0.472	5	0.490	5
General management	0.567	4	0.626	4	0.609	4	0.561	4
	Non-tertiary		Tertiary		No income		With income	
	Rating	Rank	Rating	Rank	Rating	Rank	Rating	Rank
Security	0.963	1	1.271	1	1.076	1	1.079	1
Cleaning	0.793	2	0.797	2	0.824	2	0.776	2
Repair & maintenance	0.692	3	0.731	3	0.695	3	0.715	3
Leisure & landscape	0.543	5	0.364	5	0.543	5	0.432	5
General management	0.642	4	0.525	4	0.550	4	0.634	4

Table 6 Results of *t*-test and *z*-test for the two sample means of the rated aspects

	Male	Female	18 - 60	<18 or >60	Non- tertiary	Tertiary	No income	With income
<i>Overall</i>								
Mean	0.7239	0.7326	0.7301	0.7234	0.7251	0.7352	0.7358	0.7243
Variance	0.0083	0.0106	0.0098	0.0085	0.0084	0.0116	0.0081	0.0105
Test statistic	-0.4033		0.2505 ^a		-0.4574		0.5257	
<i>p</i>	0.6878		0.8022 ^a		0.6486		0.6005	
<i>Security</i>								
Mean	1.1409	1.0267	1.0553	1.1711	0.9632	1.2658	1.0650	1.0836
Variance	0.3071	0.1908	0.2410	0.2483	0.1237	0.3901	0.2030	0.2712
Test statistic	1.0181		-0.8245 ^a		-2.4739		-0.1734	
<i>p</i>	0.3086		0.4121 ^a		0.0134		0.8623	
<i>Cleaning</i>								
Mean	0.7377	0.8257	0.7974	0.7427	0.7896	0.7840	0.8291	0.7601
Variance	0.1711	0.0740	0.1051	0.1766	0.0909	0.1638	0.1712	0.0811
Test statistic	-1.1067		0.5596 ^a		0.0674		0.8355	
<i>p</i>	0.2684		0.5773 ^a		0.9463		0.4034	
<i>Repair & maintenance</i>								
Mean	0.7438	0.6870	0.7215	0.6668	0.7007	0.7301	0.6997	0.7196
Variance	0.0834	0.0680	0.0760	0.0703	0.0625	0.0970	0.0542	0.0892
Test statistic	0.3025		0.7004 ^a		-0.4467		-0.3398	
<i>p</i>	0.7623		0.4857 ^a		0.6551		0.7340	
<i>General management</i>								
Mean	0.5552	0.6216	0.6039	0.5425	0.6272	0.5351	0.5324	0.6327
Variance	0.0949	0.0995	0.1085	0.0484	0.0874	0.1123	0.0508	0.1258
Test statistic	-0.9631		0.6880 ^a		1.2655		-1.5740	
<i>p</i>	0.3355		0.4934 ^a		0.2057		0.1155	
<i>Leisure & landscape</i>								
Mean	0.4419	0.5022	0.4721	0.4939	0.5446	0.3611	0.5529	0.4254
Variance	0.0512	0.0737	0.0651	0.0635	0.0691	0.0359	0.0759	0.0511
Test statistic	-1.1032		-0.2990 ^a		3.6782		2.2119	
<i>p</i>	0.2700		0.7657 ^a		0.0002		0.0270	

^a The test statistic and *p* value (2-tailed) for small-sample subgroup (age <18 or >60) were drawn from *t*-test; the counterparts for the other subgroups were obtained by *z*-test.

Lai, J.H.K. (2014), Influence of Personal Attributes on Perception of Residential Facilities Management Services, Facilities, Vol. 32, No. 9/10, pp. 509-521.

List of Figures

Figure 1 Shares of weighted performance ratings

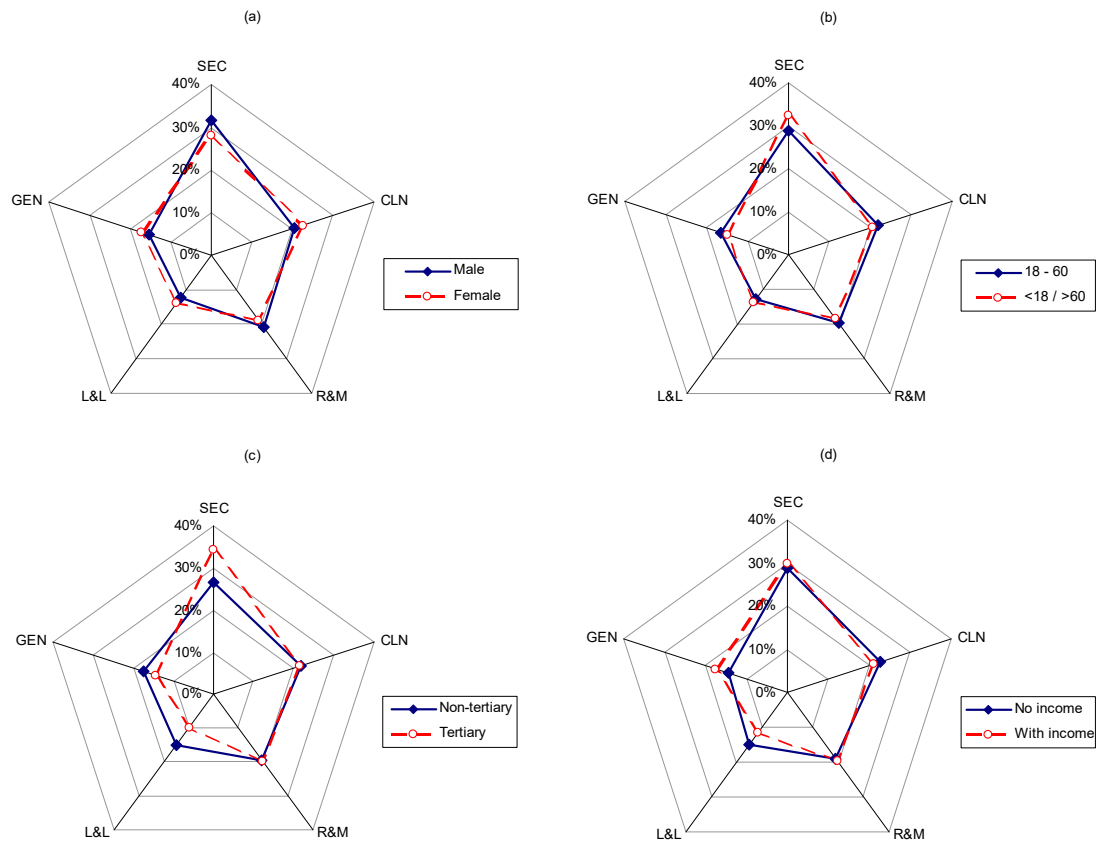


Figure 1 Shares of weighted performance ratings