Investigating the Quality of FM Services in Residential Buildings

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Abstract

Modern cities are crowded with multi-storey buildings, among them many are residential buildings. Satisfaction of the users there depends on the quality of facilities management (FM) services. To investigate how the service quality may be evaluated in a holistic manner, a two-stage study was conducted on a typical residential estate in Hong Kong. The review in the first stage found that the focus of prior studies on service quality was often on the gaps in service delivery. Assessment of the service quality provided by FM companies, in practice, is mainly through surveying the users' satisfaction with a range of quality attributes without analysing collectively their importance levels and costs input. A content analysis on the typical survey forms revealed that the FM services generally fall into five aspects: repair and maintenance, security, cleaning, general management, and landscape and leisure. The perceived importance and performance of these aspects were collected through personal interviews with 208 users in the second stage of the study. Analysing the responses by the analytical hierarchy process (AHP) method identified the existence of consistent judgments in only one-third of the sample. A further examination on the performance levels and costs of the services demonstrated how the allocation of constrained resources can be optimised for achieving quality FM services.

Keywords: facility management; service quality; performance measurement; customer satisfaction; residential building.

1. Introduction

Hong Kong, a modern city with dense buildings, has over 2.4 million residential flats (Housing Authority, 2009). The majority of the buildings accommodating these flats are multi-storey, often with a number of building blocks developed within the same residential estate. The use of the common areas there, including lobby, corridor, landscape area, etc. and enjoyment of the communal facilities (e.g. lifts, security systems) are shared among the building users.

Owners' corporation (OC), formed under the Building Management Ordinance, is an entity empowered to provide for the management of its building (or buildings in an estate) on behalf of the occupiers. A management company is typically appointed by the OC as the building manager to look after the management of the built facilities, including the direct services it delivers and the other services procured from its downstream contractors. Disbursement for these services is drawn from the management fees collected from the occupiers. To assess whether the services are value-for-money, it is necessary to properly evaluate their service quality.

Based on a typical high-rise residential estate, the study reported here was conducted in two stages to investigate how the quality of FM services for residential buildings may be evaluated in a holistic manner. In the first stage, relevant literature on measurement of service quality and samples of questionnaires that the leading FM companies used for soliciting residents' satisfaction were reviewed. In the second stage, the levels of importance and performance that the users perceived about different FM aspects, including repair and maintenance, security, cleaning, general management, and landscape and leisure were collected from the users of the estate. The responses were analysed to segregate those with inconsistent judgments from those without. The group with consistent judgments was analysed further with the expenditures on the different aspects to illustrate how the allocation of resources should be optimised for providing quality FM services.

1.1 Service Quality

Price, previous experience, etc. are among the factors which influence the expectation of customers (Johnston & Clark, 2005), and their satisfaction with the service received is a result of comparing the perceived service quality with the expected service quality (Kotler, 2003). Parasuraman et al. (1985) submits that service quality comprises five dimensions (or qualities), which, if performed satisfactorily, would help reduce the cost for monitoring the performance of service contractors (Lai & Yik, 2007a). These dimensions, in descending order of their importance, are considered by Berry & Parasuraman (1991) as follows:

1. *Reliability*. The ability to perform the promised service dependably and accurately.
2. *Responsiveness*. The willingness to help customers and to provide prompt service.
3. *Assurance*. The knowledge and courtesy of employees and their ability to convey trust and confidence.
4. *Empathy*. The provision of caring, individualized attention to customers.

5. *Tangibles*. The appearance of physical facilities, equipment, personnel, and communication materials.

The SERVQUAL model (Parasuraman et al., 1985; 1988), which identifies five gaps that may contribute to unsuccessful service delivery, has been widely used as a basis for studying service quality issues. For instance, the service quality gap between the performance of building services maintenance contractors and the client's expectation was investigated in Siu et al. (2001). Shaw & Haynes (2004) proposes using a "gap" model to compare between service quality and the level of importance that customers place on each service dimension. Likewise, the SERVQUAL model may be adapted for use in measuring the service quality of FM services (Figure 1).

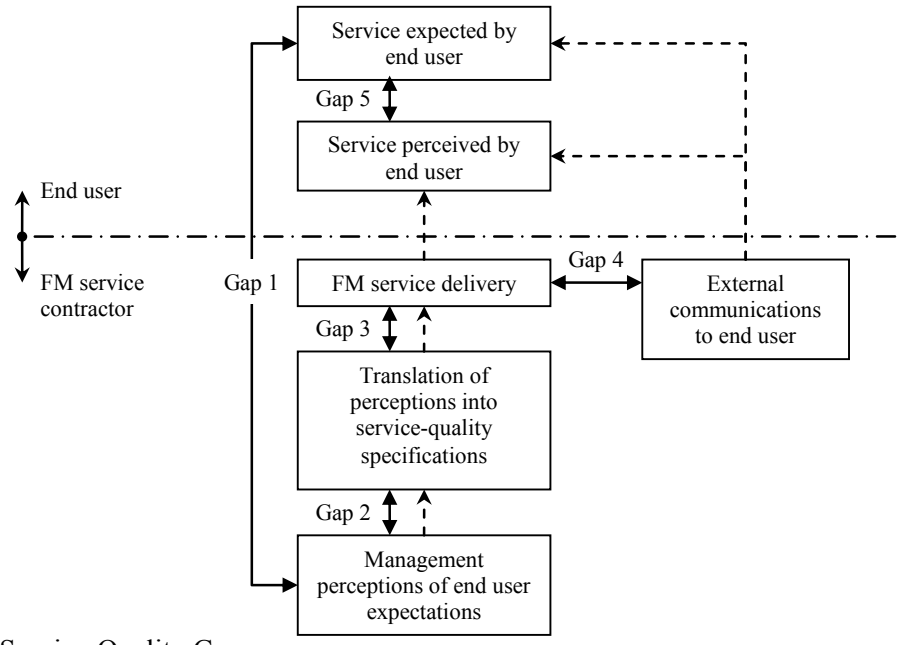

Figure 1: FM Service-Quality Gaps

The study focus of such a model is on the gaps in service delivery. To investigate the service quality, a fundamental and essential step is to find out the quality of service perceived by the end users. For this purpose, a customer satisfaction survey is useful.

1.2 FM Services and customer satisfaction survey

In principle, a customer satisfaction survey should be conducted regularly because the users' perceptions, expectations and satisfactions may vary over time (Bandy, 2002). The survey result would inform whether or not, and to what level, the users are satisfied with the performance of the services. Where improvements are found to be necessary, appropriate actions can be formulated and taken to improve the service quality (Grigg, 1996).

It has been a common practice of the FM companies in Hong Kong to carry out customer satisfaction surveys on an annual basis. In order to understand what components are commonly assessed in these surveys, the survey forms used by five of the leading companies were sampled. Inspections on these samples found that the attributes of FM services included for evaluation, depending on the provisions in the estate/building concerned, are not exactly identical. Yet, a thematic content analysis (Krippendorff, 2004) on the questions therein revealed that, besides classifying them according to the dimensions defined by Parasuraman et al. (1985), they can be grouped into five aspects: repair and maintenance, security, cleaning, general management, and landscape and leisure (Table 1).

Table 1: Main aspects of FM services for residential buildings

Repair and maintenance	***Security service***
Uniform and appearance of technicians	*Uniform and appearance of security staff*
Attitude and manner of technicians	*Attitude and manner of security staff*
Professional knowledge of technicians	*Professional knowledge of security staff*
Electricity supply system	*Communication ability of security staff*
Potable water supply system	*Initiative of providing assistance*
Flushing water supply system	*Handling the register of visitors*
Elevator system	*Security facilities (e.g. CCTV)*
Intercom system and TV reception	*Security control and patrol*
Ventilation / air conditioning system	
Fire services system	
Grounds and building fabric	
Cleaning service	***General management service***
Uniform and appearance of cleaners	*Uniform and appearance of management staff*
Attitude and manner of cleaners	*Attitude and manner of management staff*
Cleanliness of lobbies and corridors	*Professional knowledge of management staff*
Cleanliness of lift interiors	*Efficiency of handling complaints*
Cleanliness of washrooms	*Communication with residents*
Cleanliness of staircases	*Ability of handling emergency situation*
Cleanliness of grounds	*Response to resident requests*
Arrangement of waste collection	*Arrangement of recreational activities*
Landscape and leisure facilities	
Aesthetics and tidiness of plants	
Pest control	
Environmental protection measures	
Recreational facilities (e.g. play equipment)	
Leisure amenities (e.g. seating bench)	

The typical way of conducting a customer satisfaction survey is to distribute questionnaires to the mail box of each building flat. Flat occupiers are requested to use a 5-point Likert scale (1: very dissatisfied; 2: dissatisfied; 3: fair; 4: satisfied; 5: very satisfied) to indicate their level of satisfaction with the performance of various attributes of the services they received. Completed questionnaires are returned to the management office for analysis. Attributes rated low by the respondents would be regarded as underperformed, and then the facilities management team would need to find ways to improve their performance.

1.3 Holistic evaluation of service quality

Although the above method of survey has been a long-standing practice, it bears the following shortcomings:

1. The response rate of the survey, similar to that of a postal survey, is often uncertain and even low in many cases.

2. Depending on the clarity of the questions, different respondents may interpret their meanings in different ways, thus resulting in unreliable responses.

3. The focus of survey is merely on the perceived satisfaction of the FM services. Their level of importance that the users perceived is not identified. When multiple attributes are found to be unsatisfactory, facilities managers would find it difficult to decide the priority of attributes for improvement.

The first two shortcomings can be readily overcome by taking a more proactive approach, e.g. by an interview survey, to contact the users and explain clearly to them the questions. The downside of this approach, inevitably, is the need for more resources for the survey.

To address the final deficiency, the respondents can be asked to indicate their perceived relative importance between pairs of the FM aspects, followed by analyzing such responses using the analytical hierarchy process (AHP) method (Saaty, 1980) to identify the orders of importance and performance of the aspects. This approach has been successfully applied in an earlier study (Lai & Yik, 2007b) to determine the importance of indoor environmental quality attributes namely thermal comfort, air-cleanliness, noise and odour. With the aid of the evaluation matrix in Figure 2(a), the identified importance and performance of the FM aspects can be further analysed to determine which aspect should be monitored, maintained, improved or capitalized.

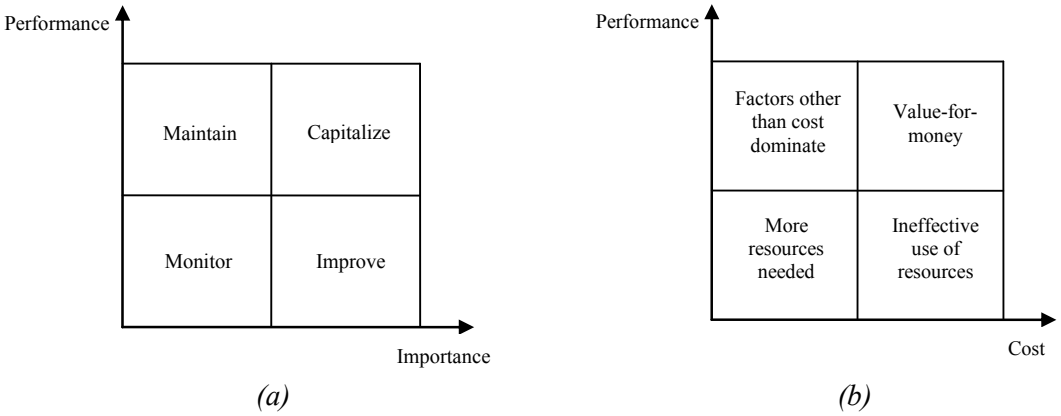

Figure 2: (a) Importance-performance matrix; (b) Cost-performance matrix

To holistically evaluate the performance of FM services, examining the users' satisfaction with the services and the order of their importance would not suffice. Because the outcomes of these two facets are dependent on the resources deployed for their production and delivery, it is essential that the expenditures on the FM aspects are also examined. In addition, due to the often-constrained budget for building operation and maintenance (Lai & Yik, 2007c), facilities managers have to prioritize the use of resources on different aspects of FM services. Plotting the levels of cost and performance of the main aspects of services on Figure 2(b) would enable the facilities managers to distinguish if they are value-for-money; the use of resources is ineffective; there are factors other than cost that give rise to high performance; or more resources are needed to improve the performance.

2. Empirical study

2.1 Data collection

To demonstrate the application of the above evaluation framework, an empirical study was carried out based on a private residential estate. For retrieving its characteristic information, an application was made to request the Buildings Department to provide the relevant record drawings, which include the site plan, layout plans of the buildings within the estate, and the drawings showing the gross floor area calculations for the buildings.

Developed over a site area of 9,627 m^2, the estate was first occupied 10 years ago. It consisted of five high-rise residential blocks, with a total of 1,432 flats. The blocks were 35- to 36-storey high, each of them housing 280 to 288 flats. In each typical floor, there were eight flats with their sizes ranging from 46 to 68 m^2.

In order to obtain quality data, a questionnaire containing three sections of questions was designed for use in personal interviews with the residential users. The first section of questions asked about the personal particulars of the interviewees. Questions in the second section were divided into two

parts: part one requested the interviewees to rate using a 5-point scale (1: no; 2: little; 3: moderate; 4: great; 5: extreme) their perceived importance of each FM aspect (i.e. security (SEC), cleaning (CLN), repair & maintenance (R&M), landscape & leisure (L&L), general management (GEN)); part two asked them to indicate based on a 5-point scale (1: very poor; 2: poor; 3: fair; 4: good; 5: excellent) their perceived levels of performance of the aspects. In the final section, the questions asked the interviewees to indicate their perceived relative importance between pairs of the FM aspects using a 9-point scale (1: equal importance; 3: moderate importance of one over another; 5: strong importance; 7: very strong importance; 9: extreme importance; 2, 4, 6 & 8: intermediate values between the two adjacent judgments), which has been widely used in other studies where the importance weightings of different attributes were investigated (e.g. Lai and Yik, 2009).

To avoid discrepancies between the interviewing processes, a team of four research personnel was provided with the same training before they were dispatched to carry out the interviews. Near to the building entrances, the residential users were invited to take part in the interviews on a voluntary basis. Totally 208 interviews were completed.

With the help of the estate manager, a summary account of the estate's annual expenditure was also collected, from which the various cost items under the five aspects of FM were identified. Analysis of these data, as will be reported, is useful in evaluating the cost-effectiveness of the services.

2.2 Analysis and discussion

The importance and performance ratings given by the respondents for each FM aspect were averaged to give their mean values and the corresponding margins of error (E) were computed based on the 95% level of confidence under the Student's t-distribution. These calculation results together with the ranks of importance and performance of the rated aspects determined according to the mean values are shown in Table 2. The SEC aspect was considered as the most important as well as the best-performed. The L&L aspect, on the other hand, was regarded as of the lowest importance and the lowest performance.

Table 2: Perceived importance and performance of the FM aspects

FM aspect	*Importance*			*Performance*		
	Mean	*E*	*Rank*	*Mean*	*E*	*Rank*
Security	*4.6731*	*0.0657*	*1*	*4.1490*	*0.0713*	*1*
Cleaning	*4.4808*	*0.0806*	*2*	*4.0673*	*0.0679*	*2*
Repair & maintenance	*4.3269*	*0.0870*	*3*	*3.8654*	*0.0796*	*4*
General management	*3.8125*	*0.1057*	*4*	*3.9135*	*0.0786*	*3*
Landscape & leisure	*3.7452*	*0.1039*	*5*	*3.8413*	*0.0782*	*5*

A plot of the mean importance ratings of the aspects against their mean performance ratings shows that they all cluster in the upper-right quadrant (Figure 3). When reference is made to the evaluation matrix in Figure 2(a), these findings imply that all the rated aspects should be capitalised, meaning that none of them should be maintained, monitored or improved. Such a result appears to be of limited use to facilities managers. Furthermore, it is unknown whether the perceived importance ratings given by the respondents were drawn from some inconsistent judgments, and, if so, the above result could be misleading.

To detect if the sample contains any response with inconsistent judgment, the pair-wise relative importance ratings given by the respondents were processed by the AHP method; and the sequence of calculations, similar to that used in Lai & Yik (2009) for finding out the importance weights of different indoor environmental quality attributes, was adopted. First, each set of ratings of the attributes was organised to from a 5x5 pair-wise comparison matrix. Second, the matrix data was input to a program that utilizes the EVCRG standard subroutine (available from the International Mathematical and Statistical Library) for eigenvalue and eigenvector calculations. Third, the principal eigenvalue and eigenvector were extracted from the EVCRG outputs, followed by computing the consistency ratio (*CR*) and normalising the elements in the principal eigenvector. Fourth, the *CR* value of each data set was checked against the allowable limit, which, for computations involving the use of 5x5 comparison matrix, is 10% (Saaty, 1995). Data sets with *CR* value exceeding this limit were treated as corrupted by inconsistent judgments.

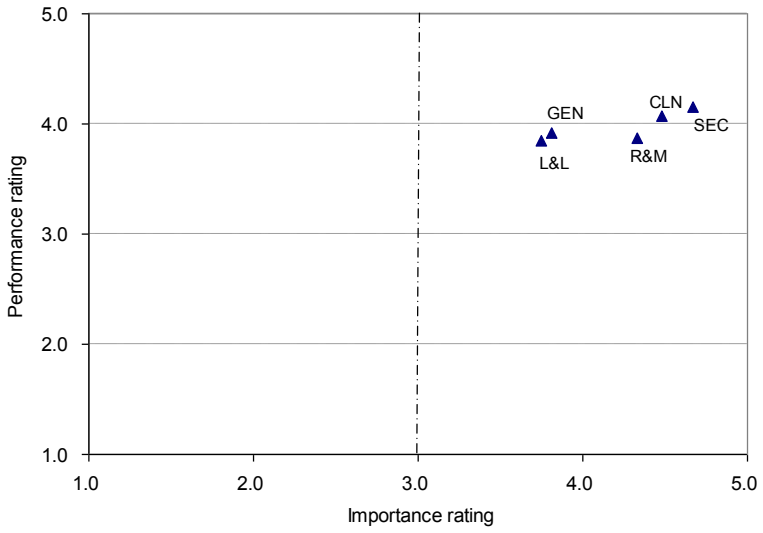

Figure 3: Performance against importance of the FM aspects

140 of the collected samples, with a mean *CR* value of 0.4003, were found to fail in the consistency test. 68 samples were able to pass the test, meaning that the rate of responses with consistent judgments was 32.7%. The mean *CR* value of this usable group was 0.0445 and its standard deviation was 0.0379.

For the responses with consistent judgments, the importance weights of the five FM aspects were calculated using the AHP method and the mean performance ratings pertaining to the aspects were also computed. These calculation results, the associated margins of error and the ranks determined based on the mean ratings are summarised in Table 3, which shows that the rank orders of importance and performance are not identical to those displayed in Table 2. A scatter-plot of these results in Figure 4 further exposes apparent differentiation between the importance weights of the rated aspects. Given that the sum of AHP weights is unity and so an aspect would carry a weight of 0.2 if all the aspects are regarded as of equal importance, the CLN and R&M aspects, with their importance ratings being close to 0.2, were of comparable and nominal importance. L&L was rated as the least important aspect and the importance of the SEC aspect obviously prevailed over that of the others.

Table 3: Perceived importance (AHP weight) and performance of the FM aspects

FM aspect	*Importance*			*Performance*		
	Mean	*E*	*Rank*	*Mean*	*E*	*Rank*
Security	*0.3298*	*0.0293*	*1*	*4.1471*	*0.1127*	*1*
Cleaning	*0.1972*	*0.0169*	*3*	*4.0441*	*0.0975*	*2*
Repair & maintenance	*0.2033*	*0.0151*	*2*	*3.9559*	*0.1140*	*3*
General management	*0.1558*	*0.0183*	*4*	*3.8676*	*0.1316*	*4*
Landscape & leisure	*0.1140*	*0.0150*	*5*	*3.8382*	*0.1362*	*5*

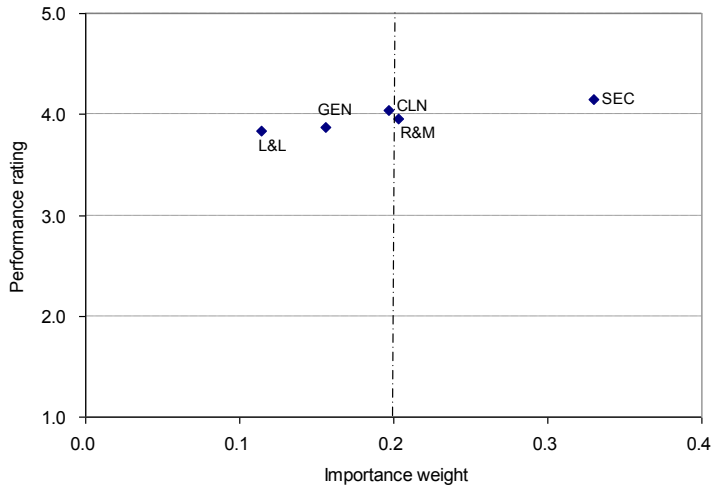

Figure 4: Performance against importance (AHP weight) of the FM aspects

The performance ranks of the five aspects were further scrutinised against their importance ranks (Figure 5). Alignment exists between the two sets of rank orders pertaining to the SEC, GEN and L&L aspects, i.e. with their performance rank and importance rank being equal. But, the performance rank of the CLN aspect is one level higher than its importance rank, and vice versa for the R&M aspect. These results suggest that while it is desirable to align between the importance and performance ranks of the aspects, the performance of the CLN aspect may need to be compromised

by utilizing some of its resources to uplift the performance of the R&M aspect in case the available resources are limited.

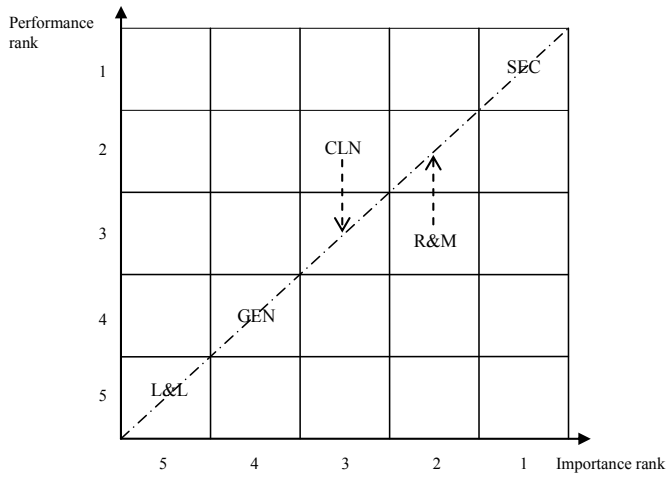

Figure 5: Alignment between performance and importance of the FM aspects

The above analyses were focussed on the perceived importance and performance of the FM aspects and the priority of resources allocation when confronted with a constrained budget. To evaluate the services in a holistic manner, their cost-effectiveness needs to be assessed too. From the collected account of the estate, the total annual expenditure on the FM services was found to be $14.74 million. Grouping the expenses into the five aspects (Table 4) reveals that the GEN aspect incurred the highest cost (36.4%), followed by the R&M aspect (30.0%) and the SEC aspect (24.3%). The CLN aspect consumed a much smaller proportion (8.1%) of the total expenditure, and that due to the L&L aspect was comparatively very little (1.3%). Also shown in the table are the expenditures of these aspects normalised by the total gross floor area of the buildings, which aggregated to HK$192.09/$m^2$.

Table 4: Annual expenditures on of the FM aspects

FM aspect	*Cost (%)*	*Cost (HK$/m2)*
General management	*36.4*	*69.87*
Repair & maintenance	*30.0*	*57.56*
Security	*24.3*	*46.68*
Cleaning	*8.1*	*15.46*
Landscape & leisure	*1.3*	*2.52*

The mean performance ratings drawn from the consistent group of responses and the costs spent on the five FM aspects are shown in Figure 6, which represents a footprint of their cost-performance states recorded at the time of the study. There appears no obvious variation between the performance ratings of the aspects. It seems that the cost-performance efficiency of the L&L aspect, with a very low level of cost input yet a performance rating comparable to the other aspects, was high. The performance of the GEN aspect, on the other hand, appears to be the least cost-efficient. Caution,

however, should be taken in interpreting these results. Because the various aspects are intrinsically different in natures, complexities, etc., their cost-performance efficiencies could not be directly compared. For example, the performance of the L&L aspect may be largely dependent on the variety of assets (e.g. play equipment, seating benches) built in the first place whereas the cost for their upkeep may be small. On the other hand, the performance of the GEN aspect may hinge on the quality of management staff, of which the recurrent cost is substantial.

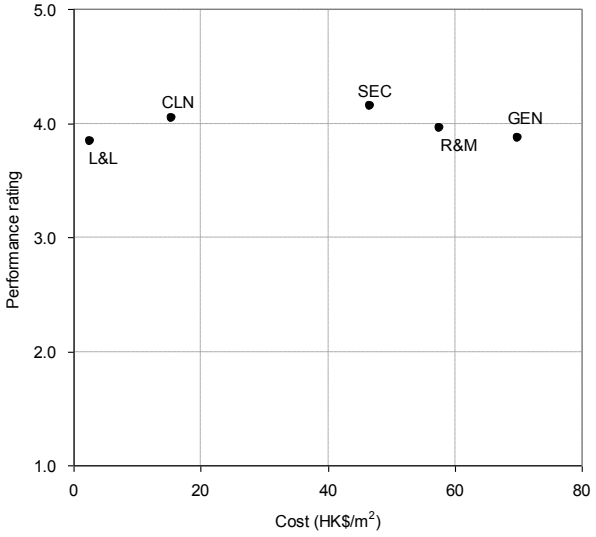

Figure 6: Performance against cost of the FM aspects

Rather than making direct comparisons between the cost-performance efficiencies of the different aspects, the performance of each aspect should be evaluated by tracking variations in its performance level against changes in the amount of its input resources. Take the earlier suggestion for improving the performance of the R&M aspect (Figure 5) as an example. When more resources are injected into this aspect, its ensuing performance should be assessed in order to gauge the effect of the added resources. If an elevated performance is resulted, the increase in input resources is value-for-money (see Figure 2(b)). But if the performance is lowered, it would mean that the use of resources is ineffective. Meanwhile, the effect of reduction in resources input to the CLN aspect should also be measured. If a rise in its performance is found, there should be other factors imposing positive impacts that outweigh the negative effect of cost cutting. In case the performance drops, the shift of resources from the CLN aspect to the R&M aspect should be reduced unless the performance drop is considered a worthwhile trade-off for an uplifted performance in the latter aspect.

3. Conclusions

Appraising user satisfaction is a fundamental step for investigating the quality of FM services in buildings. FM services for residential buildings can be classified into five aspects: security, cleaning, repair & maintenance, general management, and landscape and leisure. The empirical study reported, which was conducted through interviewing the users of a typical residential estate, found that only

one-third of the responses were drawn from consistent judgments on the perceived importance of the FM aspects.

Analysing the ranks of performance and importance of the different aspects is useful for determining the priority of resources allocation, especially when the facilities budget is constrained. A holistic evaluation of FM services also needs to examine the levels of input resources. The use of a cost-performance plot, as demonstrated using the empirical data, can help facilities managers optimise the use of resources for achieving quality FM services.

Acknowledgement

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