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Operation and maintenance: The key on the perception of Hong Kong's general public about building services

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Abstract

Purpose – The survey reported here was intended to obtain an understanding of the general public's perception about building services and building services practitioners in Hong Kong.

Design/methodology/approach – Targeting a sampling error of within ±1% at a confidence level of 95%, a team of 6 surveyors conducted face-to-face interviews with 751 laypersons at places around 11 residential estates.

Findings – Over 90% of the general public know the presence of various building services installations in buildings and 12% know that building services is the collective name of such installations. The general public are satisfied with the operability and reliability of building services installations but are just marginally satisfied with their performance at higher levels, such as energy conservation and indoor air quality control.

Research limitations/implications – A paucity of teenagers know about building services, which is a concern to the future development of both the building services profession and the facilities management (FM) industry in Hong Kong. Future work may investigate the situation in other regimes with a similar FM setting and study on how the profession is perceived for buildings with restricted access to the general public.

Practical implications – Operation and maintenance (O&M) personnel of the FM offices, who are approached by most people when problems with building services installations arise, are the key on the perceived image of building services professionals.

Originality/value – In addition to informing higher educational institutes the need to reinforcing promotion of building services engineering to school leavers, the findings can help professional institutions in formulating how the social status of building services engineers may be raised.

Keywords – Laypersons, knowledge, perception, building services, operation & maintenance

Paper type – Research paper

1. Introduction

Survey findings showed that Hong Kong people spent more than 86% of their time indoors (Chau et al, 2002). Indoor environment, therefore, should be made as safe, healthy and comfortable as possible, even though building occupants may still be subject to fire risk (Walters & Hastings, 1998) as well as adverse health impacts due to exposure to airborne infectious disease (Chan et al, 2008), radon (Tung et al, 2005) and various other kinds of indoor pollutants (Chau et al, 2002). Whereas well designed, operated and maintained fire services installations (FSD, 2005) and adequate provision of natural and mechanical ventilation (Chao et al, 1997; Mumovic et al, 2009) are the key means for mitigation of such risks, safeguarding the safety and health of building occupants requires also clean water supply and effective drainage systems, adequate natural and artificial lighting provisions, safe and reliable vertical transportation systems as well as stable electricity supply for all these systems.

The quest for thermal comfort (CIBSE, 1997) has led to the use of energy intensive heating, ventilating and air-conditioning systems in buildings, which is by now well understood to be unsustainable (Underwood & Yik, 2004); energy use for indoor comfort control should be largely reduced in the interest of sustainable development (CIBSE, 2007; Kibert, 2007). Among various sectors, including buildings, energy supply, transportation, industry, agriculture, forestry and waste, it has been shown that for the same marginal abatement cost levels, the buildings sector offers the greatest potential in realizing reduction in CO_2 emissions on a global scale (IPCC, 2007).

The range of engineering systems mentioned above, together with others such as security, building automation and audiovisual and data communication systems, are collectively referred to as building services, which are facilities in buildings. Building services systems have become indispensable in modern buildings; without them, a building would, as stated in CIBSE's website, become a cold (hot), dark, uninhabitable shell. Building services has emerged as a distinctive engineering profession. Other than professionals in this discipline who design and install building services systems, operation and maintenance (O&M) of the systems form a major part of the facilities management (FM) role (BIFM, 1999). The rapid development of the construction and real estate sectors of Hong Kong in the past decades, which underpinned Hong Kong's economic growth, could not have been achieved without the contributions of building professionals. Whereas building services engineers are among these contributors, many consider that the social recognition given to them is not commensurate with their contributions.

An extensive research study on Hong Kong's building services profession has been conducted jointly by the Building Services Division of the Hong Kong Institution of Engineers and The Hong Kong Polytechnic University (Yik et al, 2008). The aim of the study was to enhance the future roles and functions of building services engineers, which would help promote their social standing. As part of the study, a survey has been carried out to obtain an understanding of the general public's perception about building services and building services practitioners in Hong Kong. The reasons for carrying out this survey study were as follows.

1. Many building services practitioners in Hong Kong hold that the reason for the lack of awareness of their contributions to the society was because few laypersons understand what building services is. However, this perception remains anecdotal; there is no

concrete evidence to show how generally it is true. The survey, therefore, was intended to find out if the building services practitioners' perception is valid, which would be an important reference to the building services profession of Hong Kong in formulating strategies for betterment of the social recognition of building services professionals.

2. Since the general public are end-users of building services installations, obtaining their perception about the performance of building services and building services practitioners will provide building services practitioners with feedback on what aspects of their works are and are not meeting the end-users' expectations.

Therefore, the specific objectives that the survey study was intended to achieve were the answers to the following questions:

1. How big or small is the proportion of the general public in Hong Kong who knows about what building services is?

2. How well or poorly building services installations are meeting the general public's expectation on their performance?

3. How do the general public deal with problems with building services installations and who are called upon to help them?

4. How do the general public value the services rendered by building services practitioners?

2. The survey approach

For obtaining a sample of survey respondents that can represent a good cross-section of the general public, respondents should be randomly selected and should embrace youths, working adults, housewives and retirees. Places around residential estates, such as their main entrances or the recreational areas nearby were considered most suitable venues at which all kinds of target respondents could be found for efficient conduction of the survey.

Based on a conservative estimate that building services would be known to only 2% of people in Hong Kong ($p = 0.02$), and for achieving the target of a sampling error of within ±1% ($SE = 0.01$) at a confidence level of 95% ($(1-\alpha) = 0.95$; $z_{\alpha/2} = 1.96$), the minimum sample size would be (McClave et al, 2005):

$$\frac{(z_{\alpha/2})^2 p(1-p)}{SE^2} = \frac{1.96^2(0.02)(0.98)}{0.01^2} = 753 \qquad (1)$$

The survey plan was devised to achieve this sample size, taking into account the following assumptions and constraints:

1. Six (6) surveyors would be deployed to conduct survey at each residential estate;

2. Each surveyor would be able to successfully complete 4 interviews per hour, including time losses for approaching target respondents who eventually refused to participate;

3. For achieving the above completion rate, the duration of each interview should be around 5 minutes; and

4. Survey in each estate would last for no more than three hours.

Accordingly, the number of interviews that could be successfully conducted in a survey at one residential estate would be 72 (= 6 × 4 × 3). Therefore, for achieving a sample size greater than 753 respondents, surveys would need to be conducted at a total of 11 estates, which will allow at maximum 792 interviews to be successfully conducted.

Given that about half of Hong Kong's population lives in public housing estates (Housing Authority, 2008), the target composition of the 11 estates comprised 5 public rental / home-ownership housing estates and 6 private residential estates.

To ensure the survey interviews could be conducted smoothly and without hindrances, prior arrangements were made, including:

1. Sourcing for surveyors and training them on techniques of approaching respondents, raising questions and dealing with enquiries;

2. Preparing a certification letter for each surveyor such that he/she could produce it as a proof of his/her identity and the purpose of the survey so as to gain confidence from the target respondent;

3. Approaching Incorporated Owners or management offices of the target residential estates to seek their prior consent to conduct the survey in their estates and agreeing with them on the timing and locations for conducting the survey; and

4. Designing a questionnaire for use as an instrument for the interview surveys.

In order that the survey with each respondent can be completed in no more than 5 minutes, the questionnaire devised for this survey contains a limited number of questions and provides, as far as possible, pre-set options from which the respondent may choose as his/her answers to the questions. Furthermore, the questionnaire was written and the survey interviews were conducted in Chinese. As a token of our gratitude to participants in the surveys, a fast food shop coupon (HK$10 each) was presented to the respondent after successful completion of each interview.

The surveyors were appointed from the student body of The Hong Kong Polytechnic University and the survey was conducted during the summer break in July and August 2008.

3. Survey results and analysis

3.1 Survey location and number of interviews successfully completed

Table 1 shows the geographical regions of the 11 selected public / private housing estates at which surveys had been conducted, and the number of interviews completed in individual survey locations.

Table 1 Number of respondents successfully interviewed at different survey locations

Estate No.	Survey Location	No. of Responses (% of total)
1	Island East, Hong Kong (Private)	72(10%)
2	Pokfulum, Hong Kong (Private)	60(7%)
3	Hunghom, Kowloon (Private)	68(9%)
4	Lai Chi Kok, Kowloon (Private)	70(9%)
5	Lei Yu Mun, Kowloon (Public)	68(9%)
6	Shatin, New Territories (Private)	66(9%)
7	Fo Tan, New Territories (Private)	72(10%)
8	Tai Wai, New Territories (Public)	70(9%)
9	Tuen Mun, New Territories (Public)	66(9%)
10	Tin Shui Wai, New Territories (Public)	72(10%)
11	Tai Po, New Territories (Public)	67(9%)
Total		751(100%)

It was possible to meet the target of completing 72 interviews per estate at 3 housing estates only (Table 1). Nonetheless, a total of 751 interviews had been successfully completed, which just falls short of the target number (753) by 2 only.

3.2 Characteristics of the respondents

The characteristics of the respondents were as summarized in Table 2. The respondents were dominated by females (64%). A nearly even distribution of the number of respondents by their age was achieved for the age groups of less than 50 years but the number of respondents aged at or above 50 years was smaller. The majority of the respondents (59%) had secondary school education while 29% of them had college education or above. Fifty three percent (53%) of the respondents were working, 26% were students, and the remaining 21% were either retirees or housewives.

With respect to the nature of work that the respondents were doing, 427 of them were working in job fields outside those listed in the questionnaire, and thus were categorized under the heading 'others', which included students, catering, retail, banking, cleaning services, etc., and housewives were also grouped under this category. Among those listed job fields, commercial/business was the dominant field that far outweighed the other job fields. Among them, 6% were working in construction related fields, including the construction (4%) and the real estate fields (2%), and another 5% of them were in the engineering field. As these are fields akin to building services, it would be more likely that respondents working in these fields would know about building services than those in the other job fields (see results presented later).

The job positions listed in the questionnaire for the respondents to choose include managerial, professional, technical, operational and others. Similar to nature of work, the greater number of respondents was pertaining to job positions that fell outside this list, accounting for 35% of the total number of respondents.

Over 70% of the respondents indicated that they could communicate in English and 11% of them regarded themselves as proficient in English. This implies that the majority of the respondents would be able to recognize the name building services no matter whether it was communicated to them in Chinese or English.

Table 2 Characteristics of the respondents

Description		No. (% of total)
Gender:	Male	271(36%)
	Female	480(64%)
Age (years):	<19	148(20%)
	20-29	175(23%)
	30-39	151(20%)
	40-49	142(19%)
	50-59	92(12%)
	>60	43(6%)
Level of Education:	Primary School	88(12%)
	Secondary School	441(59%)
	College or above	222(29%)
Occupational Status:	Studying	196(26%)
	Working	399(53%)
	Retired	156(21%)
Nature of Work: (Current or before retirement)	Construction	32(4%)
	Commercial / business	170(23%)
	Education	41(5%)
	Government	31(4%)
	Engineering	34(5%)
	Real Estate	16(2%)
	Others	427(57%)
Job Position (Current or before retirement)	Managerial	122(16%)
	Professional	126(17%)
	Technical	53(7%)
	Operational	189(25%)
	Others	261(35%)
Level of English	Proficient	79(11%)
	Can communicate	459(61%)
	Limited	143(19%)
	Cannot communicate	70(9%)
Total		751(100%)

3.3 Knowledge about building services

The questionnaire includes a list of 11 types of building services systems and the respondents were asked if they were aware of each of those systems being installed in various kinds of buildings. As the survey results (Table 3) show, the presence of 10 out of the 11 building services systems in buildings was recognized by 90% to 99% of the respondents. A major reason for this should be that the names of these systems can clearly reflect the functions of the systems, which enabled the respondents to recognize the systems as they see their components (e.g. fire hydrants, hose reels and sprinklers) or make use of those systems themselves (e.g. lifts, lighting and water supply & drainage systems).

Although only 56% of the respondents recognized that buildings may be equipped with building automation systems, this percentage is surprisingly high because the system is accessible only to building and plant operators rather than the building occupants and is, among the listed building services systems, the least visible to the general public. A possible explanation for this is that the respondents might have interpreted its Chinese name as meaning automatic control systems, which they thought buildings would need to have.

Table 3 Knowledge about presence of BS systems in buildings

	Types of BS Systems	% of Yes
a)	Air-conditioning and mechanical ventilation	94
b)	Electricity supply	99
c)	Lighting	99
d)	Fire detection and protection	94
e)	Water supply and drainage	97
f)	Lifts and escalators	98
g)	Security	97
h)	Building automation	56
i)	Telecommunication and broadcasting	91
j)	Hot water system	90
k)	Gas services	94

With regard to the collective name of these engineering systems, 15% of the respondents indicated that they knew it (Table 4). Twelve percent (12%) of them expressed that the collective name in English should be 'Building Services Systems' and 13% indicated the same in the Chinese translation of this collective name, while 'M&E Systems' was known to 1% and 2% of them to be the collective name in English and Chinese respectively. This result shows that among those who claimed that they knew this name, 'Building Services Systems' or its Chinese translation was known to more of them.

Table 4 Knowledge of respondents about building services systems

		No. (% of Total)
a)	Respondents with knowledge about the collective name	112(15%)
	Those regarded the collective name as 'Building Services systems'	87(12%)
	Those regarded the collective name as 'M&E systems'	10(1%)
	Others	1(0%)
	Those regarded the collective name as '屋宇裝備系統'(1)	98(13%)
	Those regarded the collective name as '機電系統'(2)	14(2%)
	Others	1(0%)
b)	The means through which they learned about it	
	Previous educational studies	30(27%*)
	Working	35(31%*)
	Friends	18(16%*)
	Others (number / % of total*)	20(18%*)
	- common sense (6, 5%*)	
	- catalogue (1, 1%*)	
	- internet (1, 1%*)	
	- guess (3, 3%*)	
	- website (1, 1%*)	
	- not specified (8, 7%*)	
	Total	103(92%*)

(1) This is the Chinese translation of Building Services systems
(2) This is the Chinese translation of M&E systems
* Figures refer to the percentages of the total number of the respondents who claimed to know the collective name

The work environment and previous studies were the major means through which the respondents became knowledgeable of the collective name of the systems. The other means include learning about it from friends, common sense and sources of information available from the internet.

Table 5 shows a breakdown of the number of respondents who knew the collective name of building services systems by their personal characteristics. Among these 112 respondents, 43% were male and 57% female. Compared to the number of male and female respondents in the sample, 18% of the male respondents knew the name building but only 13% of the female respondents knew this name.

Table 5 Distribution of number of respondents who knew the name BS by their socio-economic characteristics

		Number (% of total) (n=112)	% (fraction) of total no. in the same group
Sex	Male	48 (43%)	17.7% (48/271)
	Female	64 (57%)	13.3% (64/480)
Age	≤19	4 (4%)	2.7% (4/148)
	20-29	31 (28%)	17.7% (31/175)
	30-39	27 (24%)	18.9% (27/151)
	40-49	33 (29%)	23.2% (33/142)
	50-59	14 (13%)	15.2% (14/92)
	≥60	3 (2%)	7.0% (3/43)
Education	Primary School	6 (5%)	6.8% (6/88)
	High School	49 (44%)	11.1% (49/441)
	College or above	57 (51%)	25.7% (57/222)
Occupation	Studying	17 (15%)	8.7% (17/196)
	Working	80 (71%)	20.1% (80/399)
	Retired	15 (14%)	9.6% (15/156)
Nature of work	Construction	13 (12%)	40.6% (13/32)
	Business	20 (18%)	11.8% (20/170)
	Education	10 (9%)	24.4% (10/41)
	Government	6 (5%)	19.4% (6/31)
	Engineering	15 (13%)	44.1% (15/34)
	Real Estate	5 (4%)	31.3% (5/16)
	Others	43 (39%)	10.1% (43/427)
Post	Managerial	31 (28%)	25.4% (31/122)
	Professional	31 (28%)	24.6% (31/126)
	Technical	10 (9%)	18.9% (10/53)
	Operational	16 (14%)	8.5% (16/189)
	Others	24 (21%)	9.2% (24/261)

The statistics shows that very few respondents aged below 20 years knew about building services. The dominant group who knew about building services was between 20 and 49 years old, accounting for 81% of the total number of respondents who knew this name. The percentage of respondents in an age group who knew building services increases with the age up to below 50 years old (from 18% to 23%), and drops thereafter.

The level of education of the respondent is shown to be highly influential to the probability that an individual would know about building services, from only 7% among those at primary school level to about 26% among those with education at college level or above. Similarly,

there is a much higher chance that those who are working would know about building services than those who are studying or retired. Furthermore, it is far more likely that one working at professional or managerial level would know about building services than one working at a more junior level.

As expected, much more respondents who were working in job fields akin to the building services field, including construction, real estate and engineering, knew about building services. This implies that outside the building, construction and engineering sectors, the percentage of the general public who would know about building services would be significantly lower than the overall average of 15% among all respondents in the sample. With the respondents in the construction, engineering and real estate fields discounted, the percentage of the remaining respondents who knew building services reduced to 11.8% (= (112–33) / (751–82)), which may be taken as a better estimate of the percentage of laypersons who would know building services in Hong Kong.

3.4 Experience with building services systems

For an evaluation of how well the general public perceive the performance of building services systems, the respondents were requested during the interview survey to rate a number of aspects of performance of building services systems with which they would have experience (Table 6). The rating scores used range from 1 to 5, corresponding to very poor to very good performance while 3 refers to barely acceptable performance. Two different sets of aspects of performance were listed in the questionnaire, one for building services systems in dwellings and the other for building services systems in workplaces, which may be inside various kinds of commercial / office / industrial / institutional buildings. All respondents were requested to rate the former but, for the latter, only respondents who were working were asked to provide their ratings. Out of the total of 751 respondents, the number of respondents who provided ratings for building services system performance in workplaces was 354.

For the aspects of performance of building services systems that the respondents were requested to rate, the mean rating scores of all the performance aspects were above 3, which imply that the respondents, on average, found the performance of the building services systems at least barely acceptable if not better. This applies to building services systems at both dwellings and workplaces.

For building services systems in dwellings, the reliability of electricity supply was rated the highest, with a mean score of 4.2. The reliability of lighting system and the reliability of water supply and cleanliness of water were rated the second and the third, followed by the reliability of lifts and escalators. The reliability and clarity of mass media signal was rated the lowest, with a mean score of 3.52, which is still significantly above the score for barely acceptable.

Among the 354 respondents who had provided ratings for building services systems in their workplaces, the reliability of electricity supply was also rated the highest but with a mean score of 3.91 which is lower than that for its counterpart in dwellings. The three best aspects of performance of building services systems are identical to those in dwellings but the reliability of lifts and escalators was rated as the fifth, after the reliability of fire services systems. Energy saving was perceived, on average, to be close to barely acceptable, with a mean score of 3.03 only, while indoor air quality (3.25), indoor temperature and humidity

control (3.31) and indoor noise control (3.4) were regarded as just marginally better, by less than half a grade.

Table 6 Respondents' rating on the performance of building services systems at their dwellings and workplaces

		Average rating* (SD)
a)	At home	
i.	Reliability of electricity supply	4.20(0.80)
ii.	Reliability of water supply system and cleanliness of water	3.91(0.88)
iii.	Reliability of drainage system	3.81(0.94)
iv.	Reliability of lifts and escalators	3.89 (0.92)
v.	Reliability of fire services system	3.54(1.32)
vi.	Reliability of lighting system	3.96(0.86)
vii.	Degree of silence of public lifts and water pumps	3.71(0.96)
viii.	Reliability and clarity of television signal	3.69(0.97)
ix.	Reliability and clarity of mass media signal	3.52(1.15)
b)	At Workplaces	
i.	Indoor temperature and humidity control	3.31(1.11)
ii.	Indoor air quality control	3.25(1.14)
iii.	Indoor noise control	3.40(1.19)
iv.	Reliability of electricity supply	3.91(1.10)
v.	Reliability of water supply system and cleanliness of water	3.56(1.22)
vi.	Reliability of drainage system	3.38(1.26)
vii.	Reliability of lifts and escalators	3.48(1.33)
viii.	Reliability of fire services system	3.51(1.34)
ix.	Reliability of lighting system	3.81(1.07)
x.	Energy saving	3.03(1.23)
	Number of respondents for part b) and % of the total	354(47%)

* '1' – very poor, '3' – barely acceptable, '5' – very good

From the ratings for building services systems in workplaces, it can be observed that the respondents rated all aspects on system reliability higher than aspects of performance that go beyond basic operability of the systems. This implies that the building services systems that they have experience with could function normally when and where their services were called for, but their operating performance was not perceived as much higher than barely satisfactory.

As shown in Table 7, 86% of the respondents indicated that they would call upon the management office for help whenever they encounter problems with building services installations at home, while only 16% would call upon an engineering company for help. Eighty three percent (83%) of them indicated that technicians would come and fix the problems for them. Only very few of them (7%) indicated that engineers would come to help. When asked about whether the persons came could fix the problems, 13% of the respondents indicated that they could always solve the problems, 58% said they could solve the problems most of the times, and 26% said they could only solve the problems sometimes.

Among the 354 respondents who answered questions related to building services system at their workplaces, 74% of them indicated that they would call upon the management office for help when they encounter problems with building services installation at their workplaces, while only 29% would call upon an engineering company for help. Ninety percent (90%) of

the respondents indicated that technicians would come to help them fix the problems, and 18% said engineers would come. The latter percentage figure is significantly higher than that for dwellings, indicating that more engineers would attend fault calls in more complex buildings such as commercial / office / institutional buildings. Twenty two (22%) of them indicated that the persons attended the fault call could always solve the problems, 57% said they could solve the problems most of the times, and only 19% said they could only solve the problems sometimes. Compared to residential buildings, the statistics for building services systems at workplaces may be taken as evidence that the effectiveness of operation and maintenance works in commercial / office / institutional buildings is generally slightly better than in residential buildings.

Table 7 Experiences with problems with building services installations

When encountering problems with building services installations:		No of responses (% of the total no. of responses*) At home	No of responses (% of the total no. of responses**) At workplace
i.	*Who would you call upon for help? (Respondents can choose more than one answer)*		
	Management office	644(86%)	263(74%)
	Engineering company	122(16%)	104(29%)
	Others	27(4%)	45(13%)
ii.	*Who would come and solve the problem? (Respondents can choose more than one answer)*		
	Engineer	50(7%)	63(18%)
	Technician	620(83%)	318(90%)
	Others	96(13%)	37(10%)
iii.	*Can they solve the problem?*		
	Always	95(13%)	77(22%)
	Most of the time	432(58%)	202(57%)
	Sometimes	193(26%)	68(19%)
	Rare	31(4%)	7(2%)
	Total number of respondents	751(100%)	354(100%)

* Percentages computed based on the total numbers of 751.
** Percentages computed based on the total numbers of 354.
Note: As respondents could choose more than one option, the overall percentage may be greater than 100%.

3.5 Perceptions of the respondents about BS engineers' work

The last question in the questionnaire requested the respondents to rate the importance of the work of building services engineers, how well they have performed and whether the public should know more about building services engineers' work. The rating was based on a scale of 1 to 5, with 1 corresponding to strongly disagree, 3 to neutral and 5 to strongly agree. The results are summarized in Table 8.

Table 8 Perceptions about building services engineers' work

Statements	Mean (SD)
The work of building services engineers is important	4.24(0.77)
Building services engineers perform their works well	3.67(0.77)
The public should know more about building services engineers' works	4.01(0.9)

Note: Mean computed from rating scores of 1 to 5: '1' – strongly disagree; '3' – neutral; '5' – strongly agree.

The majority of the respondents strongly agreed that the work of building services engineers was important (with a mean score of 4.24) but the rating they gave on their performance was lower (mean score 3.67), although this still at the positive side. They generally agreed that the public should know more about building services engineers' work (mean score 4.01). In particular, all respondents working in the building services sector considered that the public should know more about building services engineers' work. Interestingly, respondents who considered building services engineers' work important tended to rate their performance higher (bi-variate coefficient 0.411).

4. Concluding remarks

The survey findings summarized above show that the vast majority (>90%) of the respondents were able to recognize the presence of common trades of building services installations in residential and other types of buildings, but only 15% of them knew the collective name building services. With those respondents working in job fields akin to building services discounted, the percentage of the respondents who knew building services would be about 12%. This would already be significantly higher than the extent that some building services engineers would expect but is certainly not high when compared to other professions like medicine, law, accounting, architecture, etc.

While the names of individual services installations are mostly self-explanatory, the collective name 'building services' is less easy to recognize by laypersons and requires introduction to them. Nonetheless, there are various means through which laypersons could get to know building services. The chance that an individual would know about building services would increase with one's age, education level and job position.

Unfortunately, very few teenagers knew about building services. This highlights that steps need to be taken to promote building services to school children, as their lack of knowledge about building services would adversely impact the chance that school leavers with good calibre would choose building services degree programmes for their higher education. This would, in turn, impact the quality of new engineers who would join the building services profession. Therefore, the relevant professional institutions and academic departments in universities should seriously look into this problem and should take positive steps to turn-around this situation.

Irrespective of the types of buildings, the management offices of buildings are the front-line contact when people encounter problems with building services installations. At this level of interaction between building services practitioners and the general public, technical staff rather than professional engineers would provide the end-users with the needed repair services and they generally could help people fix their problems.

In any case, building services engineers in the FM field, which embraces operation and maintenance, would have much greater chances of dealing directly with the general public. They, therefore, should act as ambassadors of the building services profession shouldering the responsibility of introducing building services professionals' contributions to laypersons, including demonstration of the quality and value of their own work to end-users. However, this is a great challenge to O&M engineers because whether they can play this role well hinges on their ability in solving problems for end-users of building services installations, but they would be called upon only when there are problems with the building services installations that they oversee.

The other survey findings show that building services engineers would have a long way to go in raising their social status. The aspects of performance of building services systems that the respondents rated the highest were the reliability of electricity supply, lighting and water supply systems, which applies to both residential and other types of buildings. Lift systems in residential buildings was ranked the fourth but its place was taken by fire services in other types of buildings. The respondents regarded the building services systems in their workplaces generally acceptable in operability. The aspects of performance beyond availability for operation, however, were generally just marginally above barely acceptable. The respondents agreed that building services engineers' work is important and the public should know more about their work but much less strongly so on their work performance.

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