Original Article

Assessment of building maintenance management in Malaysia: Resolving using a solution diagram

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ABSTRACT This article examines the process of building maintenance and management in Malaysia with the aim of identifying factors causing poor maintenance in various types of buildings, and delivering a new improved process. The study focuses on the management of building maintenance, including setting up organisations, policies and quality standards. It makes extensive use of questionnaires and surveys as a means of data collection. The surveys cover all aspects of maintenance management in Malaysia, including occupant satisfaction, number of staff members and the strategies used in maintenance delivery. The framework of the process was then developed based on the outcome of the surveys. The process covers all major aspects such

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as management, staffing, training and regulation that are useful in managing maintenance sections.

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INTRODUCTION

Maintenance management in the private and the public sector has been rapidly changing throughout the years. This is due to several factors. The enhancement of sophisticated technology, globalisation and change of economy are some of the main causes (Horner *et al*, 1997). There are many definitions of maintenance. A prime aim of building maintenance is to preserve a building in its initial effective state, as far as practicable, so that it serves its purpose effectively (Al-Zubaidi, 1997; Chanter and Swallow, 2007). The best way to achieve excellent maintenance is to have a maintenance management that matches as closely as possible the expected requirements of the user (Pintelon, 1999). This article aims to unveil the problems that cause poor maintenance in many buildings in Malaysia.

BUILDING MAINTENANCE IN MALAYSIA

Malaysia boasts one of southeast Asia's most vibrant economies through decades of industrial growth and political stability. It has a population of almost 25.3 million (US Department of State, 2005) and its capital city is Kuala Lumpur. As far as Malaysia is concerned, real estate management and its technologies is not a highly developed subject area. In February 2001 during the opening of the Kuala Lumpur 21 Convection and Exposition, the then Deputy Prime Minister of Malaysia Datuk Seri Abdullah Ahmad Badawi made a statement (Moore and Finch, 2004):

Unless Malaysia changes their mentality to become more aware of the need to provide good services and improve the upkeep of buildings, we will forever be a Third World country with First World infrastructure.

This statement did not bring about any renewed investment in building maintenance technology in Malaysia.

The Prime Minister of Malaysia says that it is very common to see that most government buildings were not regularly maintained because most faults cannot be distinguished at their early stage (Utusan Malaysia, 2006a). On this basis, he has suggested that the Public Work Department needs to prepare building maintenance guidelines in order to identify any damage from the early stage (Utusan Malaysia, 2006b). This could also avoid the government spending more money on maintenance, and it could make certain things last longer. These guidelines are very important in order to recognise damages and failures, and hence a preventive and predictive strategy can be applied.

Table 1: The questionnaire structure

<i>Group 1 Questionnaire respondent: the building owner</i>	<i>Group 2 Questionnaire respondent: buildings' occupants</i>	<i>Group 3 Questionnaire respondent: maintenance staff</i>
1. Building usage. 2. Building age. 3. Approximate gross floor area. 4. Number of floors. 5. Number of workers in maintenance. 6. Number of occupants in building.	1. Did they respond promptly to any request made? 2. Was the requested work completed by the time it was needed? 3. If it was necessary for the job to be delayed was this communicated to you? 4. Were interruptions kept to a minimum? 5. Was the worksite left neat and orderly?	1. Academic qualifications 2. Working experience 3. Age 4. Gender

DATA GATHERING/METHODOLOGY

There are 15 buildings involved in this study. They are all located in Lembah Klang and have different functions such as hotels, high-rise offices and hospital buildings. The questionnaire was chosen because it is the most convenient method to use at all levels of participants, and because many of the possible subjects move around the building during the course of their work, which makes interviewing problematic (Mahmud, 2008). The questionnaire structure is shown in Table 1.

HOSPITALS

A hospital is a building that operates 24 hours a day with sophisticated biomedical equipment that requires a host of utilities, air conditioning and refrigeration, stabilised power supply systems and medical equipment that plays a very significant role in the health-care delivery system (Al-Zubaidi, 1997; Shohet, 2003; Joseph and Francis, 2008). This health-care building represents perhaps the most difficult group of largely public sector buildings to maintain, because of their complex engineering services and their heterogeneous nature. Furthermore, safety and hygiene considerations make the condition of these buildings a particularly sensitive issue (Chanter and Swallow, 2007).

HOTELS

As dynamic, complex and costly buildings to operate and maintain (Chan *et al.*, 2001), hotels' diverse use of space is an impact feature. Guestrooms, restaurants, health clubs, function rooms, retail stores, laundries and swimming pools are likely to exist in the same hotel. In most hotels, the engineering department is responsible for maintaining both the building and the building services system. Chan *et al.* (2001) noted that the cost of operating and maintaining the engineering system, in particular the in-house manpower, outsource contractors, energy consumption and equipment deterioration, must be properly monitored and controlled.

OFFICES

EMPORIS (2009) defines a high-rise building as a tower consisting of a multi-storied building of offices or apartments. A high-rise building is distinguished from other tall man-made structure by the following guideline: it must be divided into multiple levels of at least 2 m in height;

if it has fewer than 12 such internal levels, undivided portions must not exceed 50 per cent of the total height; indistinct divisions of levels such as stairways shall not be considered floors to purposes of eligibility in this definition (Shabha, 2003).

ANALYSIS OF RESULTS

Occupants' satisfaction

Referring to all satisfaction surveys from occupants, it is found that they are almost satisfied with the maintenance services provided. The bar chart in Figure 1 shows that the occupants' satisfaction level has a similar pattern for the three types of building. The cross-comparison analysis below compares all three types of building.

Table 2 shows that four variables have been rated as 'not satisfied' with ratings from the minimum mean of 2.5 up to the maximum of 2.8, which are shown in italic bold font. These variables are Questions 2, 3, 4 and 5. Those variables represent whether requested work is completed by the time it is needed (Q2), whether staff will communicate if jobs are delayed (Q3), whether all interruptions are kept to a minimum (Q4), and whether the worksite is left neat and orderly (Q5). Question 1, which represents whether staffs responds promptly to each request made, was rated as 'satisfied' by all respondents. This means that staff did not take too long to attend a job, but perhaps they needed a longer time to fix the failure, as this might be related to Questions 2 and 4. This requires more analysis to find out any significant factors that affect the results.

Figure 1: Cross-comparison analysis for satisfaction level of the surveyed buildings.

Table 2: Cross comparison of the occupants' satisfaction level

	Hospital			Hotel			High-rise office		
	N	Mean	Std. deviation	N	Mean	Std. deviation	N	Mean	Std. deviation
Question 1 (Q1)	79	3.3165	0.99414	80	3.2125	0.74109	100	3.5900	0.69769
Question 2 (Q2)	79	2.8354	0.66853	80	3.3875	0.60575	100	3.0500	0.75712
Question 3 (Q3)	79	3.3291	0.69285	80	3.0875	0.84485	100	2.8900	0.80271
Question 4 (Q4)	79	2.6962	0.60668	80	3.2125	0.74109	100	2.5700	0.62369
Question 5 (Q5)	79	3.0380	0.64932	80	2.8625	0.79147	100	3.6000	0.68165
Satmean	79	3.0738	0.29927	80	3.0675	0.38967	100	3.2133	0.24967
Valid N	79	—	—	80	—	—	100	—	—

Table 3: Request demand for high-rise offices, hotels and hospitals in 1 month

<i>Building</i>	<i>Building gross floor area (m²) (GFA)</i>	<i>Patients/ customers rooms</i>	<i>No. of maintenance staff (N)</i>	<i>Total maintenance request (NI) per month</i>	<i>GFA/N</i>	<i>NI/N</i>
Hotel A	106 548	643	46	208	2316:1	5:1
Hotel B	13 128.25	145	12	119	1094:1	10:1
Hotel C	15 020	154	23	145	653:1	6:1
Hotel D	102 831	260	10	101	10283:1	10:1
Hotel E	100 350	231	20	172	5017:1	9:1
Hospital A	10 340	139	10	52	1034:1	5:1
Hospital B	16 320	272	8	105	2040:1	13:1
Hospital C	61 300	800	42	75	1459:1	2:1
Hospital D	150 120	2502	53	60	2832:1	1:1
Hospital E	13 560	226	12	36	1130:1	3:1
Building A	18 100	NA	40	424	452:1	11:1
Building B	10 934	NA	5	80	2186:1	16:1
Building C	6530	NA	4	41	1632:1	10:1
Building D	12 300	NA	6	83	2050:1	14:1
Building E	14000	NA	21	115	66:1	5:1

It has been recognised that the factors affecting the occupants' satisfaction level are not complete if the proportion of work towards manpower size is not analysed. Table 3 shows the data concerning buildings' details and the proportion of manpower. The first column lists the name of the surveyed building. The second shows the building gross floor area, followed by the number of patient or customer rooms in the third column. The fourth and fifth columns are the total of maintenance requests per month. The last two columns calculate the ratio of gross floor area to the number of staff and the total maintenance requests to the number of staff.

Data in Table 3 clearly show that all staff members are able to access the entire job, but they may be overwhelmed in having to maintain quite a large area. In addition to fixing and repairing all the failures requested by the occupants, maintenance staff also need to inspect the given area as part of their daily or weekly routine. They also need to check whether any of the equipment needs to be replaced or serviced. In some cases, maintenance staff were also needed to do some paperwork such as preparing meeting minutes and other administrative work.

Methods of request

Most occupants prefer to use the telephone to make a request for maintenance; Figure 2 backs up this statement. Occupants feel that it is easy to talk directly via telephone instead of using other methods of making requests. It might be faster than having to fill in a work order form. However, the effectiveness of making a request is the most important thing as it can affect the performance of the maintenance service. In addition, maintenance people must properly record every request received. The information gathered could be used in the future for any purpose, such as for setting monthly or annual budgets and weekly or monthly work schedules.

DISCUSSION OF FINDINGS

Data from the survey have revealed the condition of maintenance management and performance in three types of building in Malaysia.

Figure 2: Method of request for high-rise offices, hotels and hospitals in Malaysia.

Most buildings face similar problems in terms of breakdowns and other weaknesses that have an effect on the quality of the system. Lighting, HVAC, telecommunications and sanitation are considered to need most maintenance attention. Scheduling and prevention planning would be good solutions to improve this situation (Joseph & Francis, 2008). Most occupants prefer to use the telephone to request maintenance, and men are more likely to be employed in maintenance departments. The study has also found that most organisations need to be careful when hiring people to work in the maintenance department. It may be that some technical competency will be needed in their routine job, and if they do not have this, management would need to organise training for them. Indicators of maintenance needs might be very usefully employed in maintenance departments to ensure that there are enough people to cater to all the maintenance needs (Shohet, 2003).

Solution diagram

This diagram was developed to initially resolve some major problems, as identified on the previous sections. This includes staff competency, maintenance asset records, maintenance schedule, plan for maintenance operation and review of the process. These criteria are of the highest priority in improving the process in the management of building maintenance.

1st STEP

The first one is to appoint an officer to be responsible for all aspects of maintenance of assets in the building. According to Miles and Syagga (1987), bad management may be simply a reflection of idleness and waste among maintenance personnel, but there is usually much more to it than that. In order to have proper and smooth running of the maintenance works, the person in charge in the maintenance department must be competent in their roles and responsibilities.

2nd STEP

The second is to prepare and keep up-to-date the Maintenance Asset Records. These records list all assets that need maintenance to make sure

that they are in good working condition. Assets should be in different categories such as electrical, mechanical, structural or environmental. All assets should be coded to easily identify their priority for maintenance or service. Shepherd (2006) noted that records that are well managed as part of an appropriate record management programme will help the organisation to conduct business in an efficient, accountable manner, deliver services consistently, support managerial decision making and transparent policy formation, and ensure continuity execution, management and administration. In summary, an effective records management programme will ensure that records are available for use when it needed.

3rd STEP

The third step is to list the maintenance schedule for assets. This comprises the frequency for and all details of maintenance for each asset. The maintenance management decision diagram might be one of the options (Horner *et al*, 1997).

4th STEP

The fourth step is to plan the maintenance operation, and identify maintenance activities for all items in the records.

5th STEP

The last step is to evaluate and review the maintenance programme that has been implemented. This assessment is very important to establish whether the target has been achieved, and to find out what could be done to solve remaining problems. Figure 3 summarises the fifth step of solution discussed.

CONCLUSION

Maintenance work in Malaysia is described as a service industry. Hence, as with other service industries, maintenance work in this new era is moving towards privatisation, which has been introduced in government agencies, and is expected to present further challenges in the future

Figure 3: Five steps of maintenance solution diagram.

(Zawawi and Kamaruzzaman, 2009). It needs good professional skills to meet consumers' requirements for a proactive and high-quality service. The appearance of high technology and sophisticated buildings, known as intelligent buildings, entails the need for good maintenance services. This requires better-trained maintenance organisations from a variety of disciplines, ready to implement the technology expected to be installed in the new buildings.

For all the people involved in this critical industry, the challenge is to have good self-motivation and start promoting a 'maintenance culture', such as to encourage people to love and care for the environment.

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