**ASSESSMENT OF BUILDING MAINTENANCE MANAGEMENT IN PUBLIC BOARDING SCHOOLS**

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# Abstract

# There are defects occurred in the school facilities that were reported from time to time in the newspapers. Worst, some of the defects had caused death to the occupants. It is claimed that maintenance management practice is one of the reasons that caused the problems and could be one of the reasons that impede the successful implementation of a plan in Malaysia Education Development Plan 2013-2025, which is to provide conducive learning and teaching environment at the schools. Previous researchers have proved that the maintenance management practice is related to the occupants’ satisfaction and performance. Previous studies cover maintenance management practice and occupants’ satisfaction of daily schools but none focuses on the public boarding schools. Hence, this research aims to assess the current maintenance management practice in public boarding schools. This research was conducted using interview and questionnaire survey. It is found that the selected case studies of the public schools generally practice unplanned maintenance and the rated occupants’ satisfaction is at average level. This research also signifies that there is a significant relationship between maintenance management practice and occupant satisfaction.

# Keywords:

Maintenance Management, public schools, boarding schools, planned maintenance

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# BACKGROUND OF STUDY

# Maintenance is important to upkeep the durability of an asset. The condition of a building will show how the maintenance being treated or managed. According to Ahmad (1994), buildings will rapidly deteriorate and the performance will decline when building maintenance has been disregarded. Improper maintenance management and practices could affect the performance levels of the maintenance works and the productivity of the building users (Ali et al, 2016). School buildings require a proper maintenance to support the education performance (NCES, 2016). The process of teaching and learning can be interrupted by uncomfortable environment. There is a strong relationship between quality of educational building facilities, students academic achievement, staff and student satisfaction and the organisation’s image (Kok et al., 2011; Uline & Tschannen-Moran, 2008).

# The environment for boarding schools is different from day schools. The operation hours for boarding school are longer from day schools. With the extensiveness of the facilities provided in the boarding schools, the maintenance is become more challenging. It is due to the physical environment of the school building which is an undeniably integral part of the ecological context of learning (Lackney, 1999). The Government has launched Malaysia Education Blueprint for the year 2013-2025, which includes the improvement and standardization of school infrastructure. This shows that Malaysian government has allocated some provisions for the maintenance and upgrading work for the school facilities. The Malaysia Education Blueprint (2013) also acknowledged that maintenance of existing facilities in the schools is a noteworthy concern. (Ministry of Education, 2013).This study aims to identify the current state of school maintenance management from the occupants’ perspective. The research is believed to be valuable for the process of the government to create a conducive and supportive learning environment to the students and teachers as one of the plans in Malaysia Education Blueprint 2013-2025.

# LITERATURE REVIEW

# Conducive Learning and Teaching Environment

# There is a raising concern whether the plan to provide conducive learning and teaching environment at the schools in the Education Development Plan can be implemented effectively as defects still majorly occurred and reported in the newspapers from time to time. The 2011 Physical Infrastructure Audit report signified that over 30% of all schools in Malaysia were in need of immediate repair (Ministry of Education, 2013). Some of the schools defects were reported to cause accidents and death to the users. Table 1 summarizes the newspapers reports on the schools incidents occurred.

# It is believed that poor maintenance practice is the main factor that contributes to defects (Talib et al., 2014). Although the Government has provided instruction in Government General Circular No. 2 of 1995 or Pekeliling Am Kerajaan Bil 2 Tahun 1995 for the public agencies to implement Planned Maintenance System, but most schools do not practice scheduled maintenance and only carry out emergency maintenance when necessary (Yong & Suleiman, 2015; Mydin et al., 2014; Yaacob, 2005). According to Oseghale (2014), there is a strong correlation between safety incidents, injuries, and reactive maintenance. It was believed that lack of funding and the complexity of the process to obtain the funds from the authorities have caused the implementation of the current maintenance practice which is reactive maintenance. Akashah, et al., (2009) revealed the current process of fund application is complicated, which leads to operation of maintenance in school buildings being delayed and sometimes neglected. Other studies on the maintenance management in public buildings revealed that maintenance management in Malaysia has been very insufficient and inefficient which is due to inadequate budget or mismanagement in the financial administration (Mohd-Noor et al., 2011; Yaacob, 2005). Mohd-Noor et. al. (2011) further revealed that maintenance problem may arise since tender stage due to inadequate tender information which can lead to underestimate price, deteriorating in quality of works and inability to execute the works.

# Table 1: A compilation of reported school incidents

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# Scope of Maintenance Management

# The British Standard (1993) BS3811: 1993 defines maintenance as “the combination of all technical and administrative actions, including supervision actions, intended to retain an item in, or restore it to, a state in which it can perform a required function”. Maintenance also has been defined by Al‐Turki (2011, p.151) as all activities related to maintaining a certain level of availability and reliability of the system and its components and its ability to perform to a standard level of quality. It includes all decisions at all levels of the organization associated to securing a high level of availability, reliability and value of its asset. Maintenance is also described as the required processes and services undertaken to care for a building’s structure or/ and service form after completion or after any repair, refurbishment or replacement to current standards to enable it to serve its intended functions throughout its entire lifespan without drastically upsetting its basic features and function (Olanrewaju,2009, p.201).

# Whereas Arazi et. al. (2009, p.128) defined maintenance management as “the process of planning, directing, leading and coordinating organisational resources towards maintenance so that the building will continue to serve its intended purposes effectively and efficiently”. Marquez (2007, p. 3) explained the definition of maintenance management as “activities of the management that determine the maintenance objectives or priorities, strategies and responsibilities, and implement them by means such as maintenance planning, maintenance control and supervision, and several improving methods including economic aspects in the organization”.

# The main objective of maintenance by is to make certain the building assets are satisfactorily maintained and perform effectively and efficiently (Olanrewaju, 2012; Lee & Scott, 2008; Seeley, 1987). Building maintenance also required to presenting a good appearance and aesthetic value of the building (Olanrewaju, 2012; Seeley, 1987). The basic objectives of maintenance are to ensure optimum utilisation of human resources, financial resources, equipment and material. Regular and scheduled maintenance practice is required so that any sign of critical defects can be spotted, and immediate action can be taken. It was supported by Sherwin (2000) who opined that the ultimate reason for periodic maintenance was to improve safety rather than to increase availability or reduce costs. Health is another reason buildings need to be maintained. Molds for instance may cause allergic reaction to the users. As with many pollutants, a high concentration of mold spores in the environment is increasingly believed to be a biohazard for humans, one that cannot be seen or even smelled (Scheinder, 2003). This will lead to discomfort to those who have allergic and consequently lead to absenteeism. Distressing environment can contribute to poor performance and productivity of the occupants (Kamaruzzamand and Sabrani, 2011). Thus, maintenance is required for the safety, health and comfortable and conducive working environment to the occupants (Ali et al., 2013; Zakaria et al.,2010; Central Management Support Unit, 2001).

# Effective Maintenance Management

# The study adopts the effective maintenance management as suggested by Cholasuke et.al. (2004), as shown in Figure 1.

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# Figure 1: Effective maintenance management (Source: Cholasuke et.al., 2004)

# The model of effective maintenance management by Cholasuke et. al., 2004 highlights that it is important to integrate the functions of Policy deployment and organization; Maintenance approach; Task planning and scheduling; Information management and computerized maintenance management systems (CMMs); Spare part management; Human resource management; Financial aspect; Continuous Improvement; and Contracting out maintenance to effectively conduct maintenance management.

# RESULTS AND DISCUSSION

# Interviews were conducted to three (3) case studies which are the selected public boarding schools within Klang Valley area. Findings on the feedback from all the case studies pertaining the nine (9) elements of effective maintenance management are detailed into the elements respectively. Three interviews were done with one representative each from the case studies. Interviewee codes are as follows:

# • ISA –Interviewee from School A

# • ISB –Interviewee from School B

# • ISC–Interviewee from School C

# *i. Policy deployment and organization*

# All interviewees confirmed there is no specific policy regarding maintenance that was being implemented at the schools.

# *ii. Maintenance approach*

# All schools practice unplanned maintenance at their respective schools, where maintenance practices were generally being carried out after the failure has occurred, and need to be repaired so that they can perform to their required functions. ISA clarified that the maintenance works in the school were entirely ad-hoc based.

# *iii. Task planning and scheduling*

# According to ISB, the school has internal audit where the school condition is checked by the maintenance personnel once a year. However, ISB refused to provide the documents to be further assessed. Owing to this, there is no evidence on the school’s maintenance plan and schedule. Based on the other interviewees, the other schools do not have any task planning and scheduling for maintenance. School A and School C did not have any checklist audit on the school building condition.

# *iv. Information management and computerized maintenance management systems (CMMs)*

# All interviewees confirmed they were not using CMMS regarding maintenance in the schools except for the scope cleaning and security which was standardized by Ministry of Education.

# *v. Spare part management*

# All interviewees confirmed they did not have any inventory for the spare parts regarding maintenance in the schools which is under the responsibility of maintenance personnel.

# *vi. Human resource management*

# The principal of School A has delegated to three teachers to take care of the school buildings. Each of the teacher is responsible for different buildings. In the event of any complaint being raised, the respective teacher will inspect the defects or problems and provide report to the Principal. Further meetings are normally made to discuss on the problem and the actions required. Contractor will be called to provide quotation for the repair works. Based on the quotation, the school will apply for fund from Public Boarding School (PBS) management. Once the fund is approved, they will proceed with the repair works. ISA was further asked whether they know how to assess the complaints made. According to ISA, they were given training to do the scope but not only once. It is claimed knowledge sharing with the contractors as well as experience have helped to perform the task.

# The procedure was also similar to School B and School C except that these two schools have an Assistant Engineer (J29) for each school. Compared to teachers, Assistant Engineers are considered more knowledgeable and skilful. School B and School C highly depend on the Assistant Engineer to maintain the schools. Compared to School A, only one maintenance personnel is in charge for the whole school area in School B and School C. The Assistant Engineer works within office hour on the weekdays and on-call basis on weekends, which meant the maintenance personnel is not stationed in the school 24 hours. It also discovered that no regular training was given to the maintenance personnel in both schools.

# *vii. Financial aspect*

# As the schools are practicing reactive maintenance, funds only will be applied from PBS only when the problems or defects occur. There is no specific annual allocation from PBS and schools in maintaining the school building. ISA, ISB and ISC were unable to provide exact annual allocation for the maintenance works. All the interviewees disagreed that the fund application procedure and process is complex as they have maintenance personnel in their school. While for ISA, the fund allocation will require attachment of quotation from the contractor, thus he did not find difficulty to submit the application. When asked about the period of the approval for the application, all the interviewees cannot confirm on the exact period obtained but they claimed it is still “reasonable” period to get the answer whether the fund application approved or rejected. ISA added “It depends on the situation, if the defects concerns to health and safety, the approval is very fast. Example of the defects that the school has faced that received fast feedback from PBS is when the perimeter fencing collapsed.”

# In the circumstances where the application got rejected, the schools have to find alternatives for another source which normally from the school own fund. Priority has to be set as not all defects and problems can be attended at one time due to budget constraints. ISC added “As long the problems did not affect to the school activities, we will try to accommodate adequate physical school environment to the students and teachers”.

# *viii. Continuous Improvement*

# None of the schools implement the performance measurement tools or management system such as KPI, balance scorecard, benchmarking or etc. All the contractors’ works were assessed by in-house maintenance personal through visual inspection and no checklist involved. There is no specific KPI allocated to the maintenance personnel such as response time and closing of work order. All schools also appear to not conduct any occupant satisfaction survey to the occupants. They appear to solely rely on the complaints system. According to ISB “if there is no complaint made, it is assumed the students and teachers are happy with the school environment”. ISA and ISC also gave the same opinion as ISB.

# *vx. Contracting out maintenance*

# School A will call directly the contractor to repair the defects as they did not have the experienced and knowledgeable maintenance personnel in the school. Compared to School B and School C as they employed Assistant Engineer (J29), all small defects will be repaired by in-house personnel and only will outsource the works which are beyong the capacity of their personnels. Cost estimation will be done by the maintenance personnel. There is a procedure set by Government through Surat Pekeliling Perbendaharaan Bil. 2 Tahun 2001 - Had Nilai Perolehan, Kuasa, Tanggungjawab Lembaga Perolehan Dan Jawatankuasa Sebut Harga. For the work that does not involve alteration to the original building structure, that exceed RM20,000 to RM100,000.00, the quotation shall be based on Schedule of Price and the work shall be awarded to Pusat Khidmat Kontraktor (PKK) registered contractor Class F. For the work that does not involve alteration of the original building structure, that exceeds RM20,000 to RM200,000.00, the school will invite the contractor to submit quotation. For the work involve alteration of building structure and mechanical and electrical, the school needs to refer to technical department. For other small projects, the schools will call the contractors who have been working with them in the past.

# CONCLUSIONS

# The public boarding schools appear to be practising unplanned maintenance approach. This is similar to the daily schools that are generally practising reactive maintenance (Yong & Suleiman, 2015; Mydin et. al.,2014; Syamilah, 2009). For the spare part management, the public boarding schools have established inventory lists. However, it is found that the schools do not have inventory list or checklist audit for the building physical for assessment. It is opposed to the requirement of planned maintenance system in the Government General Circular No. 2 of 1995 or Pekeliling Am Kerajaan Bil 2 Tahun 1995. Based on interview with PBS officer, he was in the opinion that planned maintenance system may not be implemented in the schools due to budget constraint. This relates with Chua and Ali (2011), who also found that the implementation of planned maintenance system is impossible due to issues and challenges such as budget constraint, technology complexity, inadequate resources and attitude of maintenance personnel. Other elements of maintenance managements such as maintenance policy, task planning and scheduling, and information technology system are not in practice. Mohd Sabri (2007) opined that the elements are not effective in schools due to the size of the school premises and inadequate skilled maintenance personnel. The major differences of the maintenance management practice between the case studies are on human resource management.

# There are a few elements of effective maintenance management that appear to be neglected by the schools such as maintenance policy, task planning and scheduling, usage of CMMS or supporting system, performance management and etc. Thus, it is recommended for the schools and Ministry of Education (MoE) to implement these elements in the system for the improvement of the school environment. Furthermore, it is also recommended for MoE to establish the guidelines for the school management in maintaining the school facilities for standardization. The guideline will help the school management to improve their maintenance practice in planning and execution. Further research is recommended to investigate the elements to be provided in the guideline.

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