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Improving Maintenance Management Practices on Conventional Method at Malaysian Polytechnic

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ABSTRACT

A key factor adversely affecting building facilities and infrastructures maintenance is the conventional method application such as paper-based form and unsystematic database at Polytechnic. Maintenance management is particularly problematic at Polytechnic where assessing and planning decisions are made poorly with building facilities and infrastructures maintenance. The prime objective of this study is to review conventional method gaps for actual maintenance management practices to reach a better understanding of the utilisation of conventional method on building facilities and infrastructures maintenance at Malaysian Polytechnic. As a precursor to this work, the paper reviews that the conventional method brings a lot of problems related to paper-based form and unsystematic database such as poor service delivery, inadequate financial and poor maintenance planning. The findings reveal the need for more sophisticated maintenance management solutions at Polytechnic. The paper concludes by presenting a research framework for developing the new approaches of Maintenance Management System (MMS) in the future.

Keywords-Conventional Method; Maintenance Management; Building Facilities and Infrastructures Maintenance; Malaysian Polytechnic

Introduction

Maintenance management is the post-construction process and is practiced at Polytechnic institutions around the world (Hamid & Alshawi, 2005). Polytechnic is the education institutions and incline to produce the graduate that knowledgeable in technical and vocational skills. Therefore, the quality teaching and learning is emphasized at Polytechnic. In addition, the engineer has responsibility to improve the maintenance management for the building facilities and infrastructure or otherwise, the unexpected accident appears that burden on staff for their negligent in maintenance management. Maintenance management is divided into various activities such as procurement process, schedule maintenance and project management that comprise of multi-faceted services and depend on the orientation of the organization. The most prominent area in maintenance is building and infrastructure that contain three basic elements of civil, electrical and mechanical engineering. Maintenance management function is to generate decision and action to control and upkeep the building and infrastructure (Sullivan *et al.*, 2010). There are many issues related to maintenance management problems by using conventional

method at Polytechnic (Arman, 2005). The poor service delivery due to paper-based form application is among of the problems as required extensive time to recover data collection. The file information is in mistaken handling, recorded in unsystematic database and difficult to edit yet to update because the data is made in hand writing (Lazim&Samad, 2011). The conventional method affects to the quality and the efficient of maintenance management processes at Polytechnic (Nowak, 2011). As an example, Port Dickson Polytechnic (PPD) facing the problems of maintenance backlogs for its building facility (Ismail, 2012). According to Ainaet *al.* (2011), the Kaduna Polytechnic in Nigeria face the issue of fungi associated deterioration of repainted wall surfaces at interior wall of female hostel due to improper supervision on painting activities. Meanwhile, Nowak (2011) stated that, one of the buildings at Rensselaer Polytechnic Institute (RPI) in United States of America (USA) has collapsed and fortunately no injured because of the incident. Mostly, RPI buildings are old structured and have long life time span. This accident indicates the important of building sustainability that include in maintenance management services for facilities.

In order to make maintenance management effective for Polytechnic, there needs to be an integrated maintenance management process from the identification stage to the maintenance execution for facility. This paper reviews current maintenance management practices and explores the Information and Communications Technology (ICT) tools and techniques implemented. It starts with a review of current maintenance management practices on construction maintenance and the common problems. The ways in which maintenance are being managed are discussed and areas for improvement are highlighted. The paper concludes with a discussion of the findings showing the outline features of a research framework for more sophisticated maintenance management solutions for Malaysian Polytechnic.

Maintenance Management Processes at Malaysian Polytechnic

According to Hassan (2010), the maintenance management processes at Polytechnic in Malaysia started from complaints by students that brought students to the office counter to report defects. The reports are received by Maintenance Management Unit for inventory identification and are recorded in database for immediate action and reference. The engineer instructs the civil technician, electrical technician and mechanical technician for the maintenance execution of facility. They categorize the defect report into one of four types, namely which are “directly repair”, “need spare part”, “need outside contractor” or “not economical to repair”. The technicians manage the facilities by themselves for defects that are to be directly repaired and defects needing spare parts, with the exception of defects that need an outside contractor. The outside contractor involved in tender construction or quotation forms for executing the tasks. The facilities are disposed for defect that is not economical to repair. The progress report of project tasks must be sent by preferred contractor for recording by Maintenance Management Unit. The invoice regarding information of facilities repaired for payment process is given by contractor through Polytechnic's bursary unit (Ismail, 2012). Therefore, three main components which are inventory identification, condition assessment and maintenance planning and execution are captured to precede in maintenance management processes. Inventory identification is to record the facilities that need for operation and maintenance. The facility defects are depends on corrective maintenance and preventive maintenance at Polytechnic. Condition assessment is to identify the type of rehabilitation action that induced technicians to the facility location of building facilities and infrastructures. The contents of these data are important in order to rank the priorities facilities to conduct first for the next stage of maintenance activity. Meanwhile, the maintenance planning and execution is addressed to minimize maintenance cost, maximize facility performance and minimize risk of failure with respect to facilities. The performing of

life cycle costing analysis is used to predict initial and future expenditures to reduce the maintenance cost of facility. The facility deterioration in condition is determined to increase the facility performance while the facility can be considering for the probability and the consequences of failure to avoid the risk of facility failure (Ng, Gable and Chan, 2003).

Conventional Method of Maintenance Management

The poor user satisfaction due to paper-based form and unsystematic database has occurred for a long time without an effective action. According to survey undertaken by Wahab (2005), 78% respondents mentioned that, they are 'dissatisfied' while 22% are 'satisfied' for building performance and facilities provided at Kulim Polytechnic. The facilities are divided into four types which are lecture room, lecture hall, laboratory and rest room. There are big differences between the percentage of 'satisfied' and 'dissatisfied'. The 'dissatisfied' indicated that the lower quality of maintenance management and by providing short courses planning to enhance staff knowledge, skills and competency, it is not enough to resolve the problems when the service application is terrible.

Prior the issues concerned, all of the reports regarding to facilities defect must utilize "BorangLaporanKerosakan", where the student and staff have to fill up the paper-based form and sent to related department unit respectively. Student and staff are not motivated to report defect due to many form needed for that task. They also have to take the risk condition for report losses before reach the related department. Moreover, the student and staff have to replenish the form after rejected in case of fault information and other related factor. As a complainer, they difficult to identify their complaint status whereby have to call or send an email for progress information (LazimandSamad, 2011). The application of paper-based form also included in corrective and preventive maintenance activities such as facility services, facility disposed, supplier, contractor list and for statistical data. The maintenance management staffs difficult to update the data recorded instantly and this contribute to the negligent management (Lateef, Khamidi and Idrus, 2010). Meanwhile, the existing database such as Microsoft Word and Microsoft Excel is based on intensive paper-based form in order to record the defects. Sometimes the maintenance management staff misplaced and unhanding many paper report. Therefore, it led to the difficulty for staffs to determine the facility budget either in a month or a year because there is no system to record the number of facilities defect accurately. In addition, the application of current database drives into limited and slow operation when data becoming more huge and complex (LecorcheandSenecal, 2002). The staff require an extensive time to recover data and this potentially turn into devastates time. The poor accessibility of data collection affects the criticality to assign the problems on maintenance planning at Polytechnic.

Essentially, the maintenance management system should have decision making process by using Information and Communication Technology (ICT) to manage maintenance planning and maintenance backlogs (Razali, Halim and Jusoff, 2011). The decision is produced by communication technology, data collection, documents, knowledge and model. In addition, there is lots of maintenance software which are widely used. This software is able to record and process data for future maintenance references, such as Computerized Maintenance Management System (CMMS), Computer-Aided Facilities Management (CAFM), Integrated Workplace Management System (IWMS) and Financial Management Information System (FMIS). Presently, CMMS application is widely used in maintenance management processes for facilities. CMMS can reduce the negligent management due to problems emerging as a result of the need

to manage huge and complicated data, for instance, data loss caused by unsuitable places for file storage and excessive retrieval time in the recovery of data files (Lecorche and Senecal, 2002).

However, the application of conventional method such as paper-based form and unsystematic database is not consists powerful of information management tool. The staff inflexible to solve for defect in specific time and location based on the previous analysis of unsystematic database. Thus, staff unable to determine the maintenance priorities such as risk of failure and facility cost for planning consideration. In order to achieve the decision support, the information management tool should readily available to be obtained, collected, analyzed and processed (Fernandez *et al.*, 2003). Therefore, the development of Maintenance Management Systems (MMS) is expected to be beneficial in order to perform the intelligent maintenance management system which provided with decision making process to improve the conventional method that tends to be both cumbersome and ineffective at Polytechnics in Malaysia.

Improving Maintenance Management Practices at Malaysian Polytechnic

Constructability Concept

A constructability concept is about knowledge and experience analysis resulted from identifying potential problems, causes and reasons to meet the objectives. This approach provides the solution efficiency and decision that improve the management in the organization. The constructability concept also is the extended research toward the development of maintenance management (Saghatforoushet *et al.*, 2011). The problem happened at Polytechnic is the poor service delivery, inadequate financial and poor maintenance planning due to cumbersome services on maintenance management. The deficiency management is depending on method application for maintenance management processes (Lateef, Khamidi and Idrus, 2010). The conventional method such as using paper-based form and unsystematic database also lead to the improper document management and maintenance backlogs. The reasons for maintenance management problems are divided into two categories which are technical defects and managerial defects that can be breakdown such as low exposed of the modern technology and less knowledge skills with respect to the Information and Communication Technology (ICT). Based on amendments and probable solution, an initial extended system is developed and expected to meet the clarifications needs.

Computerized Maintenance Management System (CMMS)

There are many excessive downtimes that remain problem for many organizations, particularly in complex capital intensive of building facility and infrastructure. Nevertheless, the Computerized Maintenance Management System (CMMS) offer fall short of delivering useful information and able to solve the facilities demands over the priority maintenance plan (Davies & Greenough, 2011). According to Kans (2009), maintenance management has set the goal to transform its processes into sophisticated application using ICT. This needs the technology for decision making process to improve the reactive and operative maintenance. In addition, it should support with the equipment histories in order to achieve root cause failure analysis. The basic information such as symptom, problem, corrective action and unusual conditions will be updated the important historical data for future troubleshooting efforts. Therefore, the new system can perform the best decision and subsequent action accurately (Shreve, 2003).

CMMS application is widely used in maintenance management processes that present the typical selection of ICT tools and techniques used for strategic maintenance (Hassanain, Froese and Vanier,

2003). This application instantly improves the management of organization toward the quality operation and maintenance efficiency. The CMMS also become the world class management in maintenance for the multi-faceted of building and infrastructure due to its advantages of attributes and data entities (Supramani, 2005). Though CMMS reduce the negligent management and enable student to lodge defect complaint easily, however the system is not provided with decision making process (Ahmad *et al.*, 2011).

Need for Improvement

An initial assessment of the tools and techniques currently in use in maintenance management suggest that most of them are under development with a few being used on a commercial basis. According to Labib (2004), Information Technology (IT) applications in maintenance and facilities management are now commonplace for reducing accumulation of paper work in the office and increase the proper monitoring of the facilities equipment. For example, CMMS has such features as quality control system, electronic complaint and preventive maintenance. This can improve the quality and cost effectiveness of facility equipment support activities as well as can solve the faults in the shortest duration. However, more sophisticated solutions in the future are expected to use decision making process such as Decision Support System (DSS) and Executive Information System (EIS). Accordingly, this research will explore practical applications for these approaching technologies, particularly for facilitating maintenance management practices at Malaysian Polytechnic in the future.

Conclusion

The analysis presented in this paper has revealed some interesting results. There are far different between the maintenance requirement and actual maintenance for maintenance management practices at Polytechnic. It illustrates the available maintenance problems and also its potential causes and reasons. The conventional method issues lead the occurrence of disastrous results of the negligent management at Polytechnic due to technical defects and managerial defects. Based on analysis of amendments and probable solution, there is a need to develop new approaches to maintenance management in order to improve the efficacy of the maintenance process. The results of this paper will therefore be utilised when designing the interview template. Ultimately, the new improvement system with implementation of sophisticated technology will be expected to fill the gap of issues as highlighted and have the potential to transform current maintenance management practices of process in the future.

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