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E-mail : fid@uitm.edu.my

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ENHANCING UNIVERSITY BUILDING PERFORMANCE: A METHODOLOGY TO INVESTIGATE MAINTENANCE AND OPERATIONAL CONDITIONS

Mohd Fairullazi Ayob*, Mohd. Yusri Mohamed Yunus, Khairusy Syakirin Has-Yun Bin Hashim, Abdul Razak Sapian, Ahmad Tarmizi Haron

Department of Quantity Surveying and Department of Architecture, Kuliyyah of Architecture and Environmental Design, International Islamic University Malaysia. Faculty of Civil Engineering Technology, University Malaysia Al-Sultan Abdullah, Pahang*

fairullazi@iium.edu.my*

ABSTRACT

Maintaining decaying and aging educational buildings and multi-effects of inflation to maintenance cost are complex issues. The connection between quality education and building operational performance is of paramount importance to shape a well-developed educational system in the universities. Commentators asserted that the traditional maintenance procurement practice focuses on reactive maintenance, however little emphasis is given to optimize the long-term in-use costs that have to be paid to prolong the educational building service life. These papers and videos are prepared to present a designed methodology to investigate maintenance condition and operational performance of an education building for teaching and learning in one of the higher educational institutions in Malaysia with the objective to develop a prototype of life cycle cost (LCC) database requirements for a sustainable facilities management system of educational buildings. A qualitative research strategy is proposed for the study encompasses three fieldwork approaches, i.e., semi-structured interview, building condition assessment (BCA), and quick response codes (QR). The designed methodology is expected to serve as a foundational input for carrying out a comprehensive study in the development of prototype of database requirements for life cycle cost analysis of maintenance of education buildings for teaching and learning in the university. The study findings yielded from the proposed methodology is of paramount significance that would add value for improvement of life cycle cost practices in the facilities maintenance management system of the university to be in line with the key drivers of Malaysian Science, Technology, Innovation, and Economy (MySTIE) framework.

Keywords: *Methodology, University building, Maintenance, Life cycle cost*

INTRODUCTION

Education buildings are important assets in the universities for teaching and learning activities but have become very complex to be maintained at the optimum cost as the in-use costs were normally ignored and calculated separately from design and construction costs during the early phases of the projects. Commentators pointed out that there has been a critical demand to relook the present practice of university building maintenance methodology by giving greater emphasis on the optimization of maintenance cost and long-term financial capability in paying maintenance cost based on the efficient use of capital and resources throughout the service life. Therefore, these paper and video are prepared to present a designed methodology to investigate the maintenance condition and operational performance of an education building for teaching and learning in one of the higher educational institutions in Malaysia with the objective to develop a prototype of life cycle cost (LCC) database requirements for sustainable facilities management system of educational building. Life Cycle Cost (LCC) is an economic assessment technique that can estimate all costs associated with the ownership of the building from cradle to grave, which includes the initial capital costs, financial costs, operation costs, maintenance and replacement costs, and the salvage costs throughout anticipated life span (Davis Langdon Management Consulting, 2007; BS ISO 15686-5, 2008; Langdon, 2010).

METHODOLOGY

To achieve the study aim, a qualitative research strategy is proposed as the chosen methodology designed for the study because it is more suitable rather than quantitative and mixed methods research strategies for procuring data of LCC that is subjective, profound and limited in nature, which requires supplementary analysis and interpretation on the meanings, definitions, characteristics, experiences, descriptions, thoughts and emotions from the respondents' feedback (Pawar, 2020). The qualitative research strategy is designed to incorporate three fieldwork approaches, i.e., semi-structured interview, building condition assessment (BCA), and quick response (QR) codes to achieve the expected findings as illustrated in Figure 1 below. A triangular primary data collection is designed to investigate the operational performance and maintenance condition of teaching and learning facilities in the chosen university building case study.

Triangular Primary Data Collection Approaches

1.BUILDING CONDITION ASSESSMENT (BCA)

Data collection and analysis: It involves visual inspection with appropriate rating instruments of Likert score, based on the degrees of defect and degrees of priority repair. The collected data is analysed by using Matrix technique.

Expected findings:

To provide useful input for the remedy planning and strategies that can be prioritized according to the maintenance needs and optimum life cycle cost of maintenance based the severity of faults or defects found.

2. SEMI-STRUCTURED INTERVIEW

Data collection and analysis: Two rounds of interview are implemented. The 1st round of interview is conducted to analyse feedback of respondents to each question. The 2nd round of interview is conducted to require each respondent to validate the outcome of the 1st round interview based on the mean and standard deviation group scores versus the individual scores.

Expected findings:

To provide consensuses of opinions on the operational performance and maintenance condition, the issues and influencing factors, and the improvement strategies that can help to prioritize the maintenance needs and plan for remedy repair based on the efficient use of resources for achieving optimum life cycle cost of maintenance.

3. QUICK RESPONSE CODE (QR CODE)

Data collection and analysis: The digitalized complain report data presents any defects or issues that arise by reporters/complainers on the operational problem of teaching and learning facilities

Expected findings:

Collected maintenance complaints and reports from building users that include basic information like contact info, defect location, dates of the new and previous reports, and photos taking as proofs to support the submission of complaint report that that can help to prioritize the maintenance needs and plan for immediate remedy repair to achieve optimum life cycle cost of maintenance.

Figure 1.: The proposed research approaches designed for the methodology of study

An education building in one of the higher educational institutions in Malaysia is chosen as a subject of the case study because plenty of issues have been reported by the end-user community on the decaying of teaching and learning facilities in the education building. Indeed, there has been a very limited study carried out to identify the maintenance condition and operational performance on the subject case study. Hence, it is a critical demand for the study to relook the maintenance methodology presently implemented in the selected building case study by giving emphasis on the optimization of maintenance life cycle cost. The study is expected to provide useful input that can facilitate the university and maintenance agencies for the remedy planning and strategies that can be prioritized according to the maintenance needs and optimum life cycle cost based on the efficient use of capital

and resources, and could enhance the university's core services, aligning with two key drivers of the Malaysian Science, Technology, Innovation, and Economy (MySTIE) Framework—namely, augmented analytics and data discovery (science and technology driver) and education (socio-economic driver) (Academy of Sciences Malaysia, 2020).

CONCLUSION

A methodology is designed and proposed for the study to investigate the university building maintenance condition and operational performance as inputs for the development of a prototype of life cycle cost (LCC) database requirements for sustainable facilities management system of educational buildings. The literature study has established that there are very limited studies reported on the methodology to investigate the university building maintenance condition and operational performance with specific reference to the life cycle cost (LCC) of maintenance. Hence, the qualitative research strategy has been proposed as the methodology designed for the study to procure data of LCC that is subjective, profound, and limited in nature. The qualitative research strategy is incorporated with a triangular primary data collection, i.e., the semi-structured interview, building condition assessment (BCA), and quick response (QR) codes to collect comprehensive firsthand data that can facilitate the facilities management practitioners to produce a thorough and trustworthy LCC analysis of maintenance in achieving cost-effectiveness and value for money maintenance management decision making.

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