**IMPLEMENTATION OF GREEN BUILDING MAINTENANCE IN MALAYSIA: ISSUES AND CHALLENGES**

Shiela Sharif1, Syahrul Nizam Kamaruzzaman2, Michael Pitt3, Farhan Ab Rahman4

*1,4Corporate Management and Policy Branch, Public Works Department of Malaysia, Kuala Lumpur*

*1,2 Faculty of Built Environment, University of Malaya, 50603, Kuala Lumpur, Malaysia.*

*3 Faculty of Built Environment, University College London, London, United Kingdom*

\*Corresponding author: shiela@jkr.gov.my

# Abstract

# The purpose of this paper is to highlight the issues and challenges in the Implementation of Green Building (GB) Maintenance in Malaysia. Addressing all the challenges and issues in Implementation of GB Maintenance in Malaysia efficiently and positively is very important to ensure the success of implementation and execution of the GB in Malaysia. Based on the literature, six (6) challenges have been identified as the major issues to the Implementation of GB Maintenance in Malaysia such as 1) difficult to justify and manage GB maintenance contract; 2) difficult to relate the GB maintenance and GB rating tools and assessment; 3) difficult to justify life-cycle cost and wear and tear period for GB features, equipment, and innovations; 4) skilful and knowledgeable GB maintenance contractor; 5) maintenance budget allocation vs. return of investment for long-term saving; and 6) managing the client, end-user and stakeholder’s awareness about GB usage and maintenance. This paper hopes to initiate a new perspective in the smooth and effective implementation of GB Projects in Malaysia by mitigating the challenges and issues in implementing it.

# Keywords:

Green building, green building projects, implementation, challenges, maintenance, Malaysia

***Article history:***

Submitted: 28/8/2017; Revised: 28/11/2017; Accepted: 26/01/2018; Online: 1/06/2018

# BACKGROUND OF STUDY

# Repair and maintenance (R&M) practice is a process that describes how buildings and structures during its lifetime will face problems caused by environmental factors and vulnerabilities (Thaheem & Marco, 2014). Concisely, R&M play a crucial role in the life of building namely hindering risks of buildings, using proper materials and appropriate tools to reduce life-cycle cost (Adnan et al., 2012). In addition, adequate and correct maintenance leads to decreasing negative effects on the environment and occupants while increasing residents’ quality of life. Overall, this maintenance management practice is an important activity in buildings (Adnan et al., 2012; Oliveira, Lopes, & Figueiredo, 2014).

# The malpractices of maintenance management usually lead to a lot of issues, such as pipe leakage, growing fungus, structural failure, and so forth (Mohammad et al., 2014; Shanker, 2017). In USA, the Leadership in Energy and Environmental Design for Existing Buildings: Operations and Maintenance (LEED-EBOM) rating system helps the building owners and operators to measure operations and maintenance on a regular commission to maximizing operational efficiency while minimizing environmental impacts (Yudelson, 2010, p. 57). Meanwhile, the Malaysian government, specifically Ministry of Energy, Green Technology and Water (KeTTHA) and Ministry of Works have acknowledged the various green building (GB) assessment tools, such as GBI (Green Building Index), PH JKR (Public Work Department Green Rating Scheme), GreenRE(Green Real Estate) and MyCREST (Malaysian Carbon Reduction and Environmental Sustainability Tool) which were launched in 2009, 2012, 2013 and 2016 respectively to monitor the GB performance according to standards prescribed (Abd Hamid et al., 2014; Mohammad et al., 2014; Kamaruzzaman et al., 2016).

# Maintaining the building including those providing design, consultation and construction services (Atkins, 2001). The construction practitioners must be willing to change their behavior in exploring new territory and willing to adopt new products, ideas, and practices (Ofori et al., 2000). The growing interest in implementation of GB has encouraged researchers and construction practitioners worldwide to come up with actions to reduce the negative impacts of development and sharpen their competitive edge (Afshari, Issa, & Peng, 2013). For example, since all project costs are related to maintenance costs; therefore, among the ways to address it are by securing a sufficient budget and employing labor with the requisite skills and knowledge in GB maintenance operations (Abdul Lateef, 2010; Adnan et al., 2012; Mohammad et al., 2014). Thus, the main purpose of this paper is to identify the issues and challenges involved in the implementation of GB maintenance in Malaysia and addressing them accordingly.

# METHODOLOGY

# This paper is designed with literature reviews of several sources such as refereed journal articles, books, online newspaper, and some conference proceedings available on the internet. The literature search was carried out on the Web of Science, Scopus, DOAJ, Google Scholar, and Research Gate database by matching the keywords: green building, maintenance, challenges, projects, and Malaysia. Suitable papers were screened based on their title, abstract and conclusion sections. The “green building maintenance” was identified by reviewing journal articles and other reference sources, per certain criteria before being analyzed and reviewed methodically. As a result, this paper has considered 12 journal articles, 3 conference proceedings, 1 book and 2 online websites published from the year 2000 to 2017.

# RESULTS AND DISCUSSION

# Green building Maintenance Issues in Malaysia

# According to Esa et al. (2011), the implementation of GB in Malaysia is not fully comprehensive without a proper maintenance executed for all GB in Malaysia. There are several issues in GB maintenance in Malaysia that need to be addressed to develop a fully comprehensive implementation of GB in Malaysia. The issues highlighted in this paper are:

# *Difficulties to justify and manage green building maintenance contract*

# Maintenance team and their manager have encountered a difficulty to manage and justify existing green maintenance contract (Adnan et al., 2012). Maintenance manager should have adequate experience and knowledge about GB before managing a maintenance GB contract to remain competitive in the industry (Adnan et al., 2012; Afshari, Issa, & Peng, 2013).

# *Difficulties to relate the green building maintenance and green building rating tools and assessment*

# Most of the GB rating assessments such as GBI focus on the `greenness’ of the GB based on the design but the actual building after completion (Afshari, Issa, & Peng, 2013; Zainol et al., 2015). And because of this it gives difficulty in matching the maintenance activities with GB rating tools and assessment. This indicates that a successful GB is beyond than green design and technology. As a key aspect of GB, building maintenance should proceed following the “green” steps outlined by the government (Mohammad et al., 2014).

# *Difficulties to justify life-cycle cost and wear and tear period for Green Building Features, equipment and innovations*

# Most of GB features, equipment and innovations are the latest technology and new in the building industry market. However, this kind of technology has caused maintenance manager hard to justify life-cycle cost and wear and tear period for GB features, equipment and innovations that need to be replaced or upgraded in GB (Tsau et al., 2016; Jagarajan et al., 2017).

#

# *Skilful and knowledgeable green building maintenance contractor*

# Poor workmanship leads to difficulty in hiring skilful and knowledgeable maintenance contractor that has experience and knowledge (know-how) about maintenance of the GB (Abdul Lateef, O.A., 2010; Mohammad et al., 2014). Most maintenance contractors hired who are still lacking in GB experience and knowledge usually led to slow progress of the green projects and thus could have affected the implementation of GB maintenance (Esa et al., 2011; Jagarajan et al., 2017).

# *Maintenance budget allocation vs. Return of investment for long term saving*

# Deputy Minister of Prime Minister's Department and Senator Datuk Seri S. K. Devamany said "One of Malaysia's greatest challenge today is sustaining building management; we usually have budget for new buildings and infrastructures but we always don't have enough money for repair and maintenance” (Arukesamy, 2017). Budget allocation for GB maintenance is a bit costly (Mohammad et al., 2014) and allocation budget from client and stakeholder is compulsory in addition to have a comprehensive GB maintenance (Esa et al., 2011; Mohd-Noor et al., 2011). Thus, the client and stakeholder should be advised and convinced of importance of GB maintenance and return of investment for long-term utility bill saving for GB (Mohd Adnan et al., 2017).

# *Managing the client, end-user and stakeholder’s awareness about green building usage and maintenance*

# Managing the client, end-user, and stakeholder’s awareness about GB usage and maintenance is crucial in addition to make sure the implementation of the GB is a success (Esa et al., 2011; Adnan et al., 2012). Client, end-user and stakeholder must be educated in handling GB features and innovations as well as enlightened about the importance of rating tools, green lease, water saving, energy saving, and proper green waste disposal system in GB (Mohd Adnan et al., 2017).

# In addition, the attitude of “repair a building only if it is broken” is not a standard for GB maintenance and tends to be avoided (Shanker, 2017). Taken together, these highlighted issues and challenges have important implication for developing Malaysian existing green rating tools and help the end-user, client, and stakeholder gain a better understanding of the GB maintenance.

# CONCLUSIONS

# As Malaysia started to move to a more comprehensive implementation of GB projects, more and more green initiatives will be implemented by the government in the future. Therefore, a comprehensive GB maintenance is crucial to ensure the success of the GB implementation in Malaysia. The Malaysian government, Public Works Department for instance and local authorities had started to practise and support the improvements of GB maintenance activities either in new or existing buildings. The implementation of GB projects needs strong support from all the stakeholders, clients, end-users, government, and the public itself to sustain the building management. Moreover, the issues and challenges of GB maintenance could be addressed if it is parallel to the government policies and initiatives (such as National Green Technology Policy and MyCREST), industry initiatives (such as GBI and GreenRE), and practitioners’ perspectives. Lastly, the awareness campaigns or workshops need to be reinforced to educate and gives knowledge about the importance of the GB projects and maintenance and its benefit to the environment and future generations.

# ACKNOWLEDGEMENT

# The authors acknowledge the financial support of the Public Works Department of Malaysia Research Grant, grant no. JAR 1208 and collaborative work was undertaken with University of Malaya.

**References**

Abd Hamid, Z., M. Zain, M. Z., Chee, H. F., Mohd Noor, M. S., Roslan, A. F., Mat Kilau, N., & Che Ali, M. (2014). Towards a national green buidling rating system for Malaysia. Malaysian Construction Research Journal. 14(1), 1-16.

Abdul Lateef, O. A. (2010). Quantitative Analysis of Criteria in University Building Maintenance in Malaysia. Australasian Journal of Construction Economics and Building. 10(3), 51-61.

Adnan, H., Mohd Fauzi, Z. F., Rahmat, I., & Supardi, A. (2012). Maintenance Management for Public Infrastructure for Malaysian Local Authorities. ARPN Journal of Engineering and Applied Sciences, 7(11), 1514-1522.

Afshari, H., Issa, M.H., & Peng, Q. (2013). Barriers to the Design, Construction, Operation and Maintenance of Green Buildings: A State-of-the-Art Review. 4th Construction Specialty Conference, 1-10.

Arukesamy, K. (2017). Demand for building maintenance: Devamany. Retrieved July 30, 2017 from The Sun Daily Web site <http://www.thesundaily.my/news/2017/05/09/demand-building-maintenance-devamany>

Esa, M.R., Marhani, M.A., Yaman, R., Hassan, A.A., Noor Rashid, N.H., & Adnan, H. (2011). Obstacles in Implementing Green Building Projects in Malaysia. Australian Journal of Basic and Applied Sciences, 5(12), 1806-1812.

Jagarajan, R., Mohd Asmoni, M.N.A., Mohammed, A.H., Jaafar, M.N., Janice, Lee Y.M., & Baba, M. (2017). Green retrofitting – A review of current status, implementations and challenges. Renewable and Sustainable Energy Reviews, 67, 1360–1368.

Kamaruzzaman, S.N., Eric, C.W.L., Zainon, N., Mohamed Zaid, N.S., & Phui, F.W. (2016). Environmental assessment schemes for non-domestic building refurbishment in the Malaysian context. Ecological Indicators, 69, 548-558.

Mohammad I. S., Zainol N. N., Abdullah S., Neo, B. W., & Ramli N. A. (2014). Critical Factors That Lead to Green Building Operations and Maintenance Problems in Malaysia. Theoretical and Empirical Researches in Urban Management. 9(2), 68-86.

Mohd Adnan, Y., Aman, N.U., Razali, M.N., Daud, M.N. (2017). The implementation of green lease practices for office buildings in Kuala Lumpur, Malaysia. Property Management, 35(3), 306-325. <https://doi.org/10.1108/PM-12-2015-0067>

Mohd-Noor, N., Hamid, M.Y., Abdul-Ghani, A.A. & Haron, S.N. (2011). Building maintenance budget determination: An Exploration Study in the Malaysia Government practice. Procedia Engineering, 20, 435-444.

Ofori, G., Briffett, C., Gang, G. & Ranasinghe, M. (2000). Impact of ISO 14000 on Construction Enterprises in Singapore. Construction Management and Economics, 18, 935-947.

Oliveira, A. M., Lopes, I. d. S., & Figueiredo, D. (2014). Maintenance management practices of companies of the industrial pole of Manaus. Paper presented at the World Congress on Engineering and Computer Science 2014.

Shanker, Siva (2017). Malaysian maintenance culture, or lack of it. Retrieved July 30, 2017 from New Straits Time Web site <https://www.nst.com.my/property/2017/07/257053/malaysian-maintenance-culture-or-lack-it>

Thaheem, M. J., & Marco, A. D. (2014). Sustainable Repair & Maintenance of Buildings in the Developing Countries: A Risk Management Perspective and Proposal of Customized Framework. Civil Engineering and Architecture Research, 1, 14-23.

Tsau, K.Y., Mohammad, I.S., Baba, M., Abdul Jalil, R., Zainol, N.N., Neo, B.W., & Abdullah, S. (2016). Factors Hindering Green Building Performance: A Review. Sains Humanika, 8 (4-3), 65–69.

WS Atkins Consultants (2001) Sustainable Construction: Company Indicator. CIRIA C563, CIRIA, London

Yudelson, J. (2010). Greening existing buildings. New York: McGraw-Hill.

Zainol, N.N., Mohammad, I.S., Baba, M., Neo, B. W. & Nazri, A.Q. (2015). Green Cleaning: An Essential Aspect of Malaysian Green Buildings. Jurnal Teknologi (Sciences & Engineering), 75(10), 65–70.