IMPORTANT CRITERIA FOR MEASURING HERITAGE BUILDING CONDITION

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ABSTRACT

The excellence condition of a heritage building lies not only in the appearance of its individual elements, but also in the integrity of all its components, considered as unique criteria of the specific construction technology of its time and place. However, these criteria are varied and not specific. Therefore, this study aimed to identify and rank the important criteria for measuring the condition of heritage buildings in Malaysia. Data obtained through questionnaire and analyzed using Average Index (AI) to establish the important criteria. Samples were selected from a panel of experts in the field of heritage buildings management including industry players and academicians. The established criteria will be used as components to develop a new method of heritage building condition determination model in Malaysia.

Keywords: Criteria, Heritage Building, Condition Assessment, Average Index, Sustainable Architecture

Introduction

Infrastructure asset management encompasses a wide variety of activities. These include asset inventory, inspection, condition assessment and prediction, shortand long- range maintenance and repair (M&R) work planning, and budgeting. This paper focuses on best practices in condition assessment, as applied to heritage buildings (Uzarski and Michael, 2011).

Condition assessments are an important aspect of effective maintenance planning (Forcada et al., 2012). Numerous studies have highlighted the factors affecting the quality of maintenance (Idrus and Ho, 2008). However, the volume of research focused on condition assessment of heritage building has been limited (Zuraidi et. al., 2016). The incorporation of condition assessments as part of maintenance processes ensures that there is a structured, objective process for identifying the demand for condition-based maintenance works to meet strategic and operational priorities (Yacob, Ali and Peng, 2016).

The aims of condition assessment are to evaluate the physical state of building elements and services and to assess the maintenance needs of the facility. Hoxley (2002) defines the condition assessment as an inspection work and observation on the exterior and interior of a building, including the foundation, structure and mechanical systems to identify the presence of any damage to the building and its components. Meanwhile, Hollis and Gibson (2000) states that the condition assessment as part of investigation work on the construction and facilities of existing property with enough detail to enable the assessor to advise the various problems that occur in the building.

Condition assessment of heritage buildings is a vital because most of this building have existed for hundreds of years and has experienced a lot of damage (Paik, 2014). To ensure the heritage building is safe for occupancy and always in good condition, the appropriate periodic inspections need to be carried out to identify its current conditions and to prepare the remedial actions (Mohamad et. al., 2015). So, failure to inspect can contribute to the asset's future failure (Che-Ani et. al., 2010).

The literature review has found that there are heritage buildings are dilapidated, lost the characteristics of authenticity in design, architecture and building materials caused no heritage management and poorly maintained and renovated on a scale which enables (Kamal, 2013; Idris, 2009). This kind of situation will indirectly accelerate the process of building damage occurred on a heritage building in addition to destroying the original identity (Rahman, 2013). There are also a few heritage buildings that are abandoned with no known owner and left empty and unattended (Rashid and Ahmad, 2008). Weakness in managing heritage

building maintenance has resulted in serious damage to the structure and fabric of the building (Sodangi et. al., 2014). The impact of these vulnerabilities has resulted in buildings that are unsafe for occupation as well as the potential to be demolished as it did to the Rumah Agam Bok in Kuala Lumpur (Harun, 2010).

Since there is no standard for assessing the condition of the heritage building, various methods were used in making the assessment (Amir, 2010). Each method has a different criterion. Each criterion would have a different important level. Given the various inspection methods related to the building condition, a new assessment method should be established specifically to assess the condition of heritage buildings. This will ensure that the assessment of the situation is clearly distinguishable from the other building audit and building inspection.

This paper intended to identify the characteristics of condition criteria in heritage building. More specifically, the study is to identify and rank the condition assessment criteria by selected respondents which includes of industry players and academicians. The Average Index (AI) method as a quantitative approach will be applied to give more significant and reliable data in developing priority for condition assessment criteria in Malaysian heritage building.

CRITERIA USED FOR CONDITION ASSESSMENT

Condition assessments can be carried out more efficiently and cost effectively if specific assessment criteria have been determined. Over the past decades, study on building condition assessment has draws the attention from many professionals including industry experts and academic researcher (Khalil, 2016). There are many criteria and attributes were established all over the world to assess the building condition. With some modification, the criteria and evaluation approach can be adopted for the practice of heritage building management in Malaysia. Based on the previous study (Zuraidi et. al., 2016; Ramli, 2014), 23 attributes that relevant for assessing condition of heritage building have been identified. The 23 attributes are regrouped into the three main criteria as listed and explained in Table 1.

Table 1: Criteria and attributes for assessing condition of heritage building

Criteria	Sub-criteria/ Attributes
Fabric (F)	F1. Ceiling
	F2. Floor
	F3. Roof
	F4. Window
	F5. Door
	F6. Internal wall
	F7. External wall
	F8. Arch/ Lintel/ Hood
	F9. Ornamentation
	F10. Apron
Structure (S)	S1. Foundation
	S2. Column
	S3. Beam
	S4. Truss
	S5. Staircase
Services (V)	V1. Electricity
	V2. Mechanical Ventilation
	V3. Fire safety
	V4. Plumbing and sanitary
	V5. Lift
	V6. Gas system
	V7. Sewerage
	V8. Drainage

METHODOLOGY

The questionnaire survey was used for eliciting feedback of the important criteria which are grouped under three main categories of building fabric, structure and services. Respondents for this study were selected from a panel of experts who have more than 5 years experienced in the field of heritage buildings management including consultants, contractors and academicians. A five-point Likert-scale with options ranging from "1 = Not Important" to "5 = Very Important" has been adopted to elicit feedback on the proposed criteria. To determine the level of significance of the proposed criteria, average index (AI) analysis was carried out. Table 2 shows the interpretation of the AI value.

Table 2: Average index (AI) range value and interpretation

Range Value	Interpretation
$4.50 \leq AI < 5.00$	Very important
$3.50 \leq AI < 4.50$	Important
$2.50 \leq AI < 3.50$	Moderate important

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1.50 ≤ AI < 2.50	Less important
1.00 ≤ AI < 1.50	Not important

RESULT AND DISCUSSION

Among the 60 distributed questionnaires, 44 were returned and make up the valid response rate at 73.3 %. As indicated in Table 3, majority of the respondents were affiliated with academic organization (41%), followed by respondents from contracting organization (36%) and respondents in consultant organization (23%).

Table 3: Number of questionnaire distributed and response rate

Respondent	Distributed	Returned	Respone rate
Consultant org.	20	10	50%
Contracting org.	20	16	80%
Academic org.	20	18	90%

The data from questionnaire was analysed from the perspective of respected respondents. Each individual attribute perceived by all respondents was computed for overall analysis. From the ranking assigned to each attribute, the important criteria were able to be identified. Figure 1 – Figure 3 depicts the respondents' rating of the attributes for measuring condition of heritage building under the criteria of building fabric, building and structure building services.

Figure 1: AI of building fabric criteria
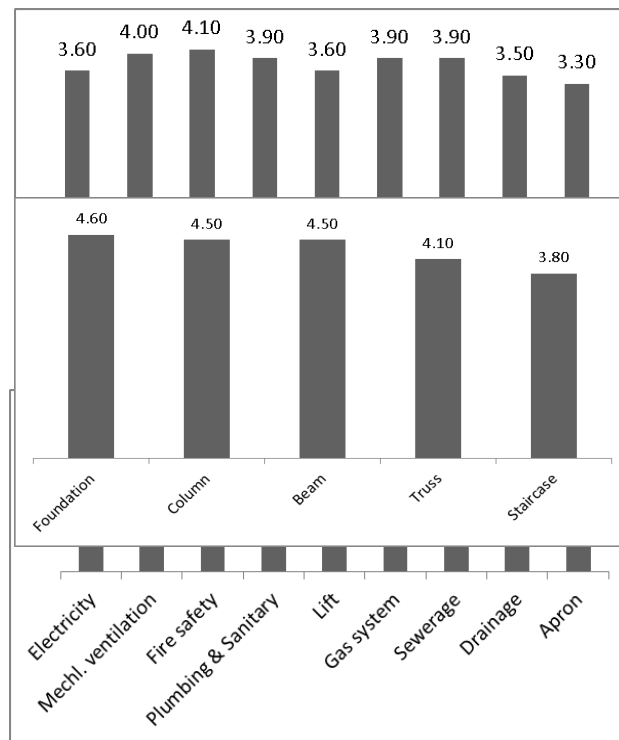
Under building fabric criteria, all attributes except ornamentation are considered as important with roof and floor scored the highest AI values. AI value of all attributes under building structure criteria are within the range 3.50< AI <5.00, suggesting that all attributes are important. Foundation, column and beam considered as very important attributes while truss and staircase both considered as important. Among the building services attributes, electricity and plumbing and sanitary scored the highest AI value. This indicates that basic services should be providing at highest priority to make sure the building can serve efficiently. Ranks are provided for the mean values analysed using average index (AI) method. Of the 23 attributes identified, only 17 attributes are counted as important. Table 4 interpretes the mean values and ranks provided for the analysis.

Table 4: Mean values and ranking for the attributes

Attributes	Mean	Rank	Interpretation
1. **Foundation**	4.60	1	Very important
2. **Column**	4.50	2	Very important
3. **Beam**	4.50	2	Very important
4. **Roof**	4.10	4	Very important

5.	Truss	4.10	4	Very important
6.	Floor	4.00	6	Very important
7.	Window	3.90	7	Important
8.	Internal wall	3.90	7	Important
9.	External wall	3.90	7	Important
10.	Staircase	3.80	10	Important
11.	Electricity	3.80	10	Important
12.	Plumbing and sanitary	3.80	10	Important
13.	Door	3.60	13	Important
14.	Fire safety services	3.60	13	Important
15.	Ceiling	3.60	13	Important
16.	Arch/ Lintel/ Hood	3.50	16	Important
17.	Mechanical ventilation	3.50	16	Important
18.	Ornamentation	3.30	18	Moderate
19.	Drainage	3.30	18	Moderate
20.	Lift	3.20	20	Moderate
21.	Sewerage	3.10	21	Moderate
22.	Apron	2.80	22	Moderate
23.	Gas system	2.60	23	Moderate

CONCLUSION

This study revealed the important criteria for measuring heritage building condition. Overall, attributes under building structure interpretes as very important criteria. This indicates that a building with good structure element is perceived as a building with good condition. Building fabric also contribute to a good condition of a heritage building. However, only part of the building services is counted as important. These findings clearly show that the good condition of the building is heavily influenced by the structure and fabric of the building. Hence this study delivers its usefulness to those who as an objective of doing maintenance in a heritage building. More importantly however, a maintenance approach for heritage buildings supported by conservation plan will contribute to a sustainable historic environment. This study concept will be pursued in achieving sustainable heritage building conservation.

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