

## **A Study on Maintenance Management Practices for the Conservation of Heritage Museum Buildings in Malacca**

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**Abstract:** Heritage buildings require an adequate system. A preliminary examination of the heritage building maintenance strategy revealed that heritage building maintenance is still at a moderate level and requires continuous development. This study aims to determine maintenance management by heritage building management and propose maintenance management best practice criteria for three different heritage museum buildings. The research involved questionnaires and interviews and as well as case studies. The History Museum, the People's Museum, and the Governor's Museum are the three buildings that have been chosen to serve as case studies for the investigation. The first and second objectives are achieved. For the interview session, respondents responded well to the maintenance management of their respective heritage museum buildings. For the second objective, the History Museum building had the highest weighted mean score of 4.60, while the People's Museum building received a weighted mean score of 4.07. 3.40 was the lowest weighted mean score for the Governor's Museum. The maintenance management best practice criteria between three museum buildings have been decided. The History Museum, with a score of 4.60, is the highest of the other building. A recommendation for the study on maintenance management practices for conserving heritage museum buildings in Malacca has been developed based on the study conducted. A recommendation for the study on maintenance management practices for conserving heritage museum buildings in Malacca has been developed based on the study conducted.

**Keywords:** Heritage building, Conservation, Maintenance, Maintenance Management

### **1. Introduction**

The condition and quality of the structure are crucial policy concerns for achieving a high standard of living. The majority of people spend over 95% of their time in or around buildings [1]. Condition

and quality of buildings reflect the image of society, the standard of living, and the behavioural attitudes of the past, all of which have contributed to the formation of society's distinctive character [2].

Buildings can no longer be occupied if they are not managed properly and kept up to date regularly. Efforts must be taken to optimize the usage of a facility and its services throughout its life and extend its usefulness through good maintenance. As a result, maintaining buildings and service systems is an essential activity that should be carried out constantly to protect and enhance an organization's investment [3].

In the absence of effective maintenance management, a historic structure will rapidly become outmoded and lose functionality. Recognizing the necessity for systematic maintenance management, this research is viewed as an important strategy to raise awareness and aid in the enhancement of the preservation of local heritage structures. This case study is part of a project to establish a best practice maintenance management framework for heritage building conservation in Melaka. The suggested conceptual framework would give a comprehensive overview and knowledge of the maintenance management methods that should be used in Melaka heritage building conservation. This will allow Melaka heritage building custodians to assess their maintenance management methods against best practices and reposition their maintenance management techniques to meet best practice standards.

### 1.1 Problem Statement

A historical event occurred more than a century in the past [4]. Due to age and event factors, structures older than 50 years can be certified as historic. Due to the deterioration that might result from age and the environment, older than 50-year-old historic structures require special attention and care [5]. Those in charge of conserving historic structures must pay special attention to and immediately address the care of these structures. Heritage building preservation will preserve the building's identity and surroundings.

Multiple aspects of heritage building maintenance management have been proven to influence maintenance performance. The absence of periodic inspections, specialized maintenance units, limited financial resources, qualified personnel shortages, and a defined set of criteria for maintaining heritage buildings all affect the quality of maintenance management in these buildings [6].

The particular qualities of the structures and the materials used in their construction need large financial resources for the upkeep of ancient buildings. In addition, he claimed that the government is currently preoccupied with the formation of new development, but when the building has been built and handed over to the owners, they lack the expertise and skills to maintain the structure. This issue will eventually result in abandoned buildings and unrepaired damage. In order to address or overcome these deficiencies, research will be performed to produce guidelines for excellent maintenance practises that may be applied to the maintenance of heritage buildings in Melaka. Heritage buildings can increase the effectiveness of their building management systems by identifying a technique for enhancing the management of building maintenance for historic structures [7].

### 1.2 Aim and Scope

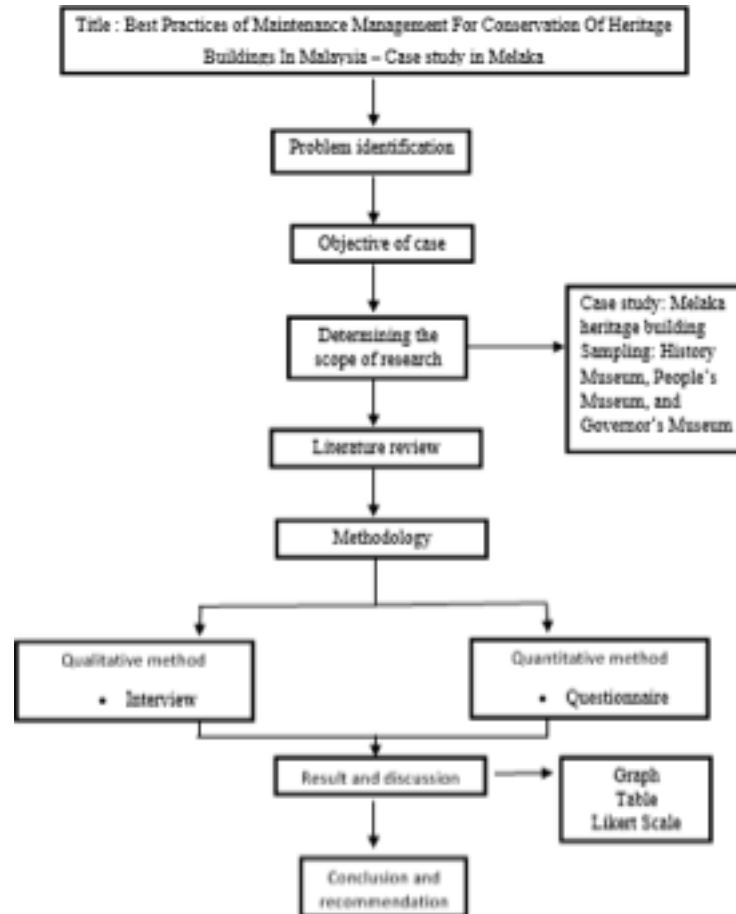
The aim of the study is to identify staff level of knowledge on the importance of maintenance management best practice criteria implemented for a heritage building. The scope of the study is by distributing survey questionnaires to respondents and by interviewing the respondents using a set of questionnaire forms to obtain information. The respondents who take part in this interview process are the heritage building management unit, assistant engineer, and maintenance unit. The objectives of this study were as follows.

- a) To determine maintenance management by heritage building management.

- b) To propose maintenance management best practice criteria among three different heritage buildings in Melaka.

## 2. Methodology

A flow chart is an infographic depicting a system's sequential operations, components, or activity. Quantitative and qualitative methods were utilized in this research to determine the situation's pattern. Figure 1 illustrates a flowchart that might be used to demonstrate the study's research methodologies and procedure more precisely and efficiently.



**Figure 1: Flow chart for the sequence of this research**

### 2.1 Interview Method

To accomplish the first aim of the study, semi-structured interviews were undertaken. The creation of this semi-structured interview form focuses on maintenance management system-related questions. The preparation of this interview form's question structure is based on a literature review. The format of the question is separated into two sections: section A and section B, according to Table 1

**Table 1: Divided section of the question**

Part	Items
Part A	Respondents' background.
Part B	Maintenance management practices that include planning activities, system setup, implementation, inspection, and repair.

## 2.2 Questionnaire

A Likert scale of 5 is used to assess participant satisfaction [2]. The questionnaires employ a Likert scale with five (5) categories to assess the staff's level of knowledge on the importance of maintenance management best practice criteria implemented for a heritage building. The frequency analysis method determines the level of staff satisfaction for each question.

- i. Section A consists of the background information of the respondents. The questions included in this part are gender, age, race, position, and period of experience working in heritage buildings.
- ii. The question are including the importance of maintenance management best practice criteria implemented for a heritage building. The Likert scale is used to measure the level of importance of maintenance management best practice criteria implemented for a heritage building regarding the following scale according to table 2

**Table 2: Likert scale is used to measure the level of importance of maintenance management best practice criteria implemented for a heritage building**

Scale	1	2	3	4	5
Description	Very not important	Not important	Moderated important	Important	Very Important

### 3.1 Interview Analysis: First objective

Interviews of the study were distributed to the experts involved, and the researchers successfully collected data from 8 experts from three heritage museum buildings represented by experts from the History Museum, the People’s Museum, and the Governor’s Museum. The selection of eight specialists for this study was based on previous research. Researchers state that no minimum sample size is needed for qualitative and quantitative studies involving interviews and questionnaires unless the selected sample must match the predetermined criteria [8]. Interview data were obtained and analysed using content analysis method. The results of the analysis of the study are displayed in tabular form according to table 3

**Table 3: Results of Interview Analysis on Current Maintenance Management on Three Museum Buildings in Malacca**

	THE GOVERNOR'S MUSEUM	THE PEOPLE'S MUSEUM	THE HISTORY MUSEUM
PLANNING	<ul style="list-style-type: none"> <li>• There is no special maintenance policy in place.</li> </ul>	<ul style="list-style-type: none"> <li>• There is a Policy for Maintenance.</li> </ul>	<ul style="list-style-type: none"> <li>• There is a Policy for Maintenance.</li> </ul>
ARRANGEMENT	<ul style="list-style-type: none"> <li>• Establish a maintenance organization.</li> <li>• Incomplete work reports and records.</li> </ul>	<ul style="list-style-type: none"> <li>• Have a maintenance group.</li> <li>• Reports and records on the job that aren't comprehensive.</li> </ul>	<ul style="list-style-type: none"> <li>• Have a maintenance group.</li> <li>• Complete and accurate work reports and records.</li> </ul>
IMPLEMENTATION	<ul style="list-style-type: none"> <li>• Unplanned Maintenance.</li> </ul>	<ul style="list-style-type: none"> <li>• Unplanned Maintenance.</li> </ul>	<ul style="list-style-type: none"> <li>• Planned Maintenance.</li> <li>• Unplanned Maintenance.</li> </ul>
INSPECTION	<ul style="list-style-type: none"> <li>• Damage complaints prompted the inspection.</li> </ul>	<ul style="list-style-type: none"> <li>• Damage complaints prompted the inspection.</li> </ul>	<ul style="list-style-type: none"> <li>• Inspections that are scheduled.</li> <li>• Damage complaints prompted the inspection.</li> </ul>
REPAIR	<ul style="list-style-type: none"> <li>• There is no particular training for employees.</li> </ul>	<ul style="list-style-type: none"> <li>• There is particular training for employees.</li> </ul>	<ul style="list-style-type: none"> <li>• There is particular training for employees.</li> </ul>

#### 3.1.1 Building 1: Governor’s Museum

One of Malacca's many museums is called the Governor's Museum, the Muzium Yang Di-Pertua Negeri and the Muzium Tuan Yang Terutama. The museum, formerly known as Seri Melaka, is located

on St. Paul's Hill in the building that formerly served as the official residence and office of the Dutch Governor of Malacca.

The heritage building management unit is responsible for the maintenance of the Governor's Museum. In order to determine the existing management methods for building maintenance at the Governor's Museum, respondents were asked questions addressing these practices. The questions centred on the current building maintenance management practices. According to replies, there was no detailed planning for the maintenance of the building. This is due to the absence of maintenance processes and standards for building maintenance work.

According to the findings of the interviews, the Governor's Museum building is maintained by an entity. The organization exists, but it does not contribute to routine upkeep. According to interviews with respondents, the organization lacks technical personnel to repair the building's damage. Contractors from the outside are contracted to perform maintenance duties and repair damage.

Unplanned and planned maintenance categories are included in the execution of maintenance work. Routine maintenance is performed following a workflow that includes planning, preventive, and repair maintenance. Based on the conducted interviews, it was found that the Governor's Museum maintenance program consisted mainly of damage repairs. Respondents asserted that only damage reports from building tenants prompted repair efforts.

A building inspection is vital for determining what needs to be repaired to schedule maintenance work [5]. The frequency of inspections depends on the extent of the building's damage. The interviews revealed that the Governor's Museum did not have a detailed and scheduled inspection. According to responses, the inspections were conducted in response to reports of damage from building occupants.

Improving the maintenance management system entails training and specialization of the organization's staff to improve the current maintenance system [6]. Referring to the maintenance management system of the Governor's Museum, respondents stated that there is no specialty or training for the organization's building maintenance personnel. The current organization lacks the personnel to oversee and monitor maintenance operations.

### 3.1.2 Building 2: People's Museum

It is believed that the museum building was created in the 1960s on the ruins of a Dutch edifice. It was initially the headquarters of the Melaka Historic City Municipal Council. The transit area was constructed in the courtyard in front of the building in collaboration with the Malayan Railway, the Royal Malaysian Air Force, and the Department of Civil Aviation of West Malaysia. The courtyard is located directly in front of the structure. The British established Coronation Park in 1953 to mark the coronation of Queen Elizabeth II.

The employees who work in the maintenance unit are responsible for ensuring that the Malacca People's Museum is always maintained in a decent condition. The responders were involved in various capacities with the building's upkeep issues. The interview with Puan Norsyam was to decide the management of the maintenance of the Melaka Peoples Museum.

The execution of maintenance management relies on creating maintenance plans that adhere to defined maintenance policies and standards [5]. According to the findings of the interviews, the planning for the People's Museum's upkeep is governed by building maintenance norms and standards. Despite this, she claimed that the company was experiencing difficulties. Thus the repair could not be performed on time.

The maintenance organization is responsible for arranging and monitoring the building's maintenance activities to maintain the facility [6]. Per discussions with responders, PERZIM has created a Maintenance Unit to preserve the People's Museum. The Maintenance Unit consists of technical

personnel who report to PERZIM and are responsible for fixing damage to the mechanical and electrical systems of the People's Museum. Utilizing inventory management and work records expedites the performance of maintenance duties. Interviews revealed that inventory and maintenance records could not be maintained systematically. The maintenance department of the People's Museum is poorly handled due to organizational flaws. Schedule and unexpected maintenance activities are involved in executing maintenance operations. According to the respondents, the maintenance undertaken at the People's Museum was unplanned.

Building inspections aim to identify damages so that maintenance work can be scheduled accordingly [5]. The People's Museum was inspected due to the building's degradation. She participated in the building inspection, according to the respondent. Because there was insufficient information, detailed inspections of the building damage could not be conducted. Consequently, special inspections done by skilled employees are not utilized in the management of the upkeep of these buildings.

The personnel must be trained and specialized in strengthening the organization's maintenance management system. Per the interviews, PERZIM provides excellent chances for technical and managerial workers to increase their maintenance-related knowledge and skills. She has outlined the training opportunities made accessible to the workers, including the CIDB Course, the Building Valuation Course, the Building Conservation Course, and the Electrical Wiring Course.

Policies and standards generally govern maintenance at the People's Museum. However, routine maintenance cannot be performed due to organizational constraints such as staff shortages and frequently inadequate funding allocation.

### 3.1.3 Building 3: History Museum

The Stadthuys building, completed in 1650 as the official residence of the Dutch Governor and Deputy Governor, exemplifies Dutch architecture. It is currently referred to as the "Museum of History and Ethnography." The museum frequently displays traditional wedding costumes and artifacts from Melaka's heyday.

In the 1650s, the Dutch administration, which had acquired control of Melaka from the Portuguese in 1641, began construction on the Stadthuys, or "Town Hall" edifice. The four-story building with a total size of 49,200 square feet, follows the terrace of Bukit St. Paul. Until the early 18th century, it was the Dutch Governor's residence and the Dutch government's seat. This edifice was the administrative center of the British government.

The respondent is the History Museum's Building Supervisor in charge of upkeep. In order to determine the current management procedures implemented at the History Museum, respondents were questioned regarding the condition of the facility.

The execution of maintenance management is predicated on creating maintenance plans that comply with defined maintenance processes and standards [5]. According to the findings of the interviews, the history museum's maintenance work is guided by established policies and maintenance standards.

The maintenance agreements specify the organization's roles and responsibilities for executing building upkeep [4]. In addition, inventory and records management are essential for the timely completion of maintenance tasks. During the interview with the respondents, he stated that maintenance work is organized by distributing duties and workload following their respective business functions. This maximizes the utilization of everyone's time and resources. Three employees in the technical section of the business are responsible for maintaining the building's facilities system and keeping the building area clean. The results of the interviews suggested that the arrangement of maintenance work is conducted in an organized and methodical manner.

The maintenance process includes both scheduled and unplanned maintenance. The maintenance process is governed by a predetermined schedule. It is dependent on the maintenance workflow, which includes three distinct types of maintenance: planning, preventative, and repair maintenance.

According to the interviewees' conclusions, the History Museum inspections were planned and based on the building's degradation. Multiple components of the structure, including the air conditioning system, electrical supply system, and mechanical system, are routinely inspected. In order to ensure the comfort of museum visitors, the History Museum undertook routine inspections and examinations for building damage.

The History Museum's maintenance organization staff have been permitted to specialize in some parts of maintenance management. Specialized Scaffolding Installation, Specialized Painter, and Specialized Electrical Wiring are some of the specialized capabilities the respondent and his team have. Organizations can improve their building maintenance skills through specialization and training.

The maintenance management system of the History Museum is based on a logical approach. The maintenance team can efficiently manage and control the building's maintenance operations. This is because having a precise and efficient organization for building maintenance has benefited the building owners in maintaining the integrity of the heritage building.

### 3.2 Questionnaire analysis

The questionnaire of this study was distributed to the experts involved, and the researcher managed to collect data from 8 respondents representing three museum buildings, namely the History Museum, the People's Museum, and the Governor's Museum. The selection of eight respondents for this study was based on previous research. Researchers state that no minimum sample size is needed for qualitative and quantitative studies involving interviews and questionnaires unless the selected sample must match the predetermined criteria [8]. Questionnaire data were obtained and analysed using Microsoft Excel. The method of analysis used is by descriptive tests using frequency, percentage, mean, weighted mean and standard deviation scores to achieve all objectives of this study.

#### 3.2.1 Part A: Demographic Analysis

This section is used to check the demographic information of respondents, including factors such as gender, age, race, position, and job experience, in order to establish respondents' legitimacy and elicit convenient responses according to Table 4

**Table 4: Summary of respondent demographics**

		Frequency (f)	Percent (%)
Gender	Female	5	62.5
	Male	3	37.5
Age	18 - 21 years	0	0
	22 - 30 years	0	0
	31 - 50 years	6	75.0
	51 - 65 years	2	25.0
Race	Malay	8	100
	Chinese	0	
	Indian		
	Others		
Position	Heritage building management unit	4	50
	Assistant engineer	2	25
	Maintenance unit	2	25
Work Experience	5 years-10 years	2	25
	11 years-20 years	4	50
	21 years-30 years	2	25

The analysis of the gender of the respondents recorded in this questionnaire showed that the female gender was higher by 5 respondents (62.50 %) and the male gender was 3 respondents (37.50 %), as shown in Table 3 above.

Additionally, it is found that the highest respondents in this study are from the group of workers aged between 31 to 50 years. It accounts for 75 percent of the total respondents. The lowest percentage of employees in this study was between the ages of 51 to 65 years, which is 25 percent.

Furthermore, it is found that the highest respondents in this study are from the Malay race. It accounts for 100 percent of the total respondents. Next, showed that the heritage building management unit reached the highest number of respondents of 4 respondents (50.00 %) while the assistant engineer reached 2 respondents (25.00 %) and the maintenance unit also reached the same respondent of 2 people (25.00 %).

Lastly, it is found that the highest respondents in this study are from the group of employees with work experience between 11 to 20 years. It accounts for 50 per cent of the total respondents. The group of employees with work experience between 5 to 10 years reached 2 respondents (25.00 %), and the group of employees with work experience between 21 to 30 years also reached the same respondent of 2 people (25.00 %).

### 3.2.2 The score perception of the respondents regarding the level importance of maintenance management best practice criteria for heritage buildings

The following table provides the score values for each item. Each item in the questionnaire was classified according to five criteria of best maintenance management practices for historic buildings: Maintenance Planning, Maintenance Organization, Use of Inventory & Records, Building Inspection & Level of Importance, and Staffing & Training. Each of these components is classified based on the dimension it represents.

**Table 5: The score perception of the respondents regarding the level importance of maintenance management best practice criteria for heritage buildings**

Criteria	Parameters	The History Museum					The People's Museum					Governor's Museum				
		1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Maintenance Planning	1. Prior to beginning building maintenance work, building maintenance policies, guidelines, and standards should be established.	0	0	0	0	3	0	0	0	2	1	0	0	0	2	0
Maintenance Organization	2. In a maintenance organization, the number of staff influences to achieve of a good maintenance organization.	0	0	0	2	1	0	0	1	2	0	0	0	1	1	0
Use of Inventory & Records	3. Inventory and record preparation play an important role in maintenance management.	0	0	0	3	0	0	0	0	1	2	0	0	2	0	0
Building Inspection	4. Maintenance work must be done in a formal form to achieve systematic work.	0	0	0	0	3	0	0	1	2	0	0	1	1	0	0



Staffing & Training	5. Offering specialized training to staff to improve skills and knowledge in building maintenance.	0	0	0	1	2	0	0	0	3	0	0	0	0	2	0
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In the Maintenance Planning section. A total of two respondents from the People's Museum and two respondents from the Governor's Museum respectively gave the opinion that prior to beginning building maintenance work, building maintenance policies, guidelines, and standards should be established is important. Besides, a total of three respondents from The History Museum and one respondent from Governor's Museum respectively gave the opinion that prior to beginning building maintenance work, building maintenance policies, guidelines, and standards should be established is very important. Respondents who gave very important opinions showed a positive understanding of maintenance organization. According to researcher, unplanned work results in the execution of unneeded work, which is regarded as uneconomical and inefficient [5].

Additionally, in the Maintenance Organization section. A total of one respondent from the History Museum and one respondent from the Governor's Museum respectively gave the opinion that in a maintenance organization the number of staff influences to achieve a good maintenance organization is moderated important. In addition, a total of two respondents from the History Museum, two respondents from the People's Museum, and one respondent from the Governor's Museum each considered it important. Next, a total of one respondent from the History Museum considered it very important. Respondents who gave very important opinions showed a positive understanding of maintenance organization. According to the researcher, a building maintenance management organisation must be prioritised to assure implementation that can benefit building owners and users [2].

Furthermore, in the Use of Inventory & Records section. A total of two respondents from the Governor's Museum gave the opinion that inventory and record preparation play an important role in maintenance management is moderated important. Besides that, a total of three respondents from the History Museum and one respondent from the People's Museum respectively considered it important. Next, a total of two respondents from the People's Museum considered it very important. Respondents who gave very important opinions showed a positive understanding of use of inventory & records. Researcher argued that a good maintenance system is the only thing that can preserve building usability and extend its lifespan [2].

Next, in the Building Inspection section. A total of one respondent from the Governor's Museum gave the opinion that maintenance work must be done in a formal form to achieve systematic work is not important. Furthermore, a total of one respondent from The People's Museum, and the Governor's Museum respectively considered it moderated important. Next, a total of two respondents from the History Museum considered it important. Lastly, a total of three respondents from the History Museum considered it very important. Respondents who gave very important opinions showed a positive understanding of building inspection. According to the researcher, well-executed conservation and care can increase the useful life of a buildings and even allow it to outlive what was initially anticipated [3].

Lastly, in the Programs & Frameworks section, a total of one respondent from the History Museum, three respondents from the People's Museum, and two respondents from the Governor's Museum respectively gave the opinion that offering specialized training to staff to improve skills and knowledge in building maintenance is important. Apart from that, a total of two respondents from The History Museum considered it very important. According to the researcher, a building maintenance management organization must have adequate staff as well as practical training, a well-organized planning schedule, an adequate budget, and records to achieve the goal of providing timely service, quality maintenance, and the ability to guarantee first-class facilities at all times.

### 3.2.3 The weighted mean score perception of the respondents regarding the best maintenance management practice criteria for heritage buildings

The table in this section presents the weighted score mean for overall item. Besides, the table in this section also presents the mean values for each item. The descriptive statistics used in this research focus on frequency analysis for weighted mean of variable scores using Microsoft Excel software.

Table 6: Weighted mean score analysis of the three Museum Building

Criteria	No of question	Mean Score		
		The History Museum	The People's Museum	The Governor's Museum
Maintenance Planning,	1.	5.0	4.33	3.67
Maintenance Organization, Use	2.	4.33	3.67	3.33
of Inventory & Records,	3.	4.0	4.67	3.33
Building Inspection, Staffing &	4.	5.0	3.67	2.67
Training	5	4.67	4.0	4.0
<b>Weighted mean score</b>		<b>4.60</b>	<b>4.07</b>	<b>3.40</b>

Maintenance planning includes formulating building maintenance policies, guidelines, and standards [4]. A statement, before commencing building maintenance work, building maintenance policies, guidelines and standards should be established providing value with the highest mean by the History Museum Building is 5. Meanwhile, the People's Museum recorded a reading of 4.33, while the Governor's Museum recorded the lowest reading of 4. Researchers argue the value of this less encouraging score has shown the negative attitude of some management in an organization concerning maintenance planning. This is because, based on the literature assessment, researcher indicated that a maintenance policy should be established prior to building maintenance work in order for the maintenance to be carried out efficiently [4].

A statement in a maintenance organization, the number of staff influences to achieve of a good maintenance organization providing value with the highest mean by the History Museum Building is 4.33. In contrast, the People's Museum scored 3.67, while the Governor's Museum registered the lowest score of 3.5. This demonstrates that professionals from the History Museum Building appreciate the significance of maintenance management best practice standards from the maintenance organization's perspective. A good maintenance organization can monitor maintenance tasks, including work quality, time, cost, and user input [5].

Besides that, analysis of the questionnaire data found that the statement, inventory, and preparation of records play an essential role in maintenance management recorded the value with the highest mean by the People's Museum Building is 4.67. The History Museum recorded a reading of 4, while the Governor's Museum recorded the lowest reading of 3. The authors argue that this less prominent mean value has indicated a lack of understanding by the building maintenance management of the importance of inventory and records. Based on a literature review, researcher asserts that the lack of maintenance records for equipment makes it difficult to perform maintenance, particularly immediate maintenance involving the safety of building occupants [8].

Furthermore, analysis of the questionnaire data revealed that the History Museum Building had a mean of 5 for the statement "Maintenance work must be performed formally to achieve systematic work." For instance, the People's Museum scored 3.67, while the Governor's Museum registered the lowest score of 2.5. According to a previous study by researcher, the primary objective of the inspection is to effectively and methodically decrease the likelihood of damage and faults to building elements and

equipment. Indirectly, all areas of safety and comfort will be more assured for users and an organization's owners and personnel [4].

Finally, a statement, offering specialized training to personnel to enhance their building maintenance skills and knowledge, provides the highest mean value for the History Museum Building is 4.67. This demonstrates that professionals from the History Museum Building appreciate the significance of maintenance management best practice standards from a building staffing and training standpoint. According to researcher, maintenance, specialization, and training can help increase staff members' understanding and organizational abilities [8]. For instance, the People's Museum scored 4, while the Governor's Museum also scored 4. The value of this less-than-encouraging score, according to the researchers, demonstrates the negative attitude of some managers within a company regarding staffing and training. This is because researcher asserted, based on a survey of the relevant literature, that the staff shortage in the implementation of maintenance work prevents the seamless completion of all monitoring, repair activities, and maintenance-related reports [5].

#### **4. Conclusion**

In conclusion, the two objectives that have been proposed at the beginning of the research were achieved through qualitative and quantitative approaches were used, which are interviews and questionnaires. In addition, the feedback of respondents for the first objective is to determine maintenance management by heritage building management. It showed that some respondents were aware of the five primary needs of the maintenance management best practice criteria method which are maintenance planning, maintenance work arrangements, maintenance kinds implementation, inspection or monitoring, and repair of maintenance systems to ensure the harmony of heritage buildings while some respondents were less aware of the importance of good practices of heritage building maintenance management.

Besides that, the History Museum recorded the highest weighted mean reading for the overall criteria of best management practices which are Maintenance Planning, Maintenance Organization, building inspection, and staffing and training. This shows that respondents from the History Museum Building in this study have shown a good understanding of each statement filed. The results of this high mean analysis can be inferred that there are best practices of maintenance management by the maintenance management of the History Museum Building.

In conclusion, the findings of this study's research analysis indicate that there are still many deficiencies in the maintenance management system for historic buildings. It is common knowledge that maintenance is the most important aspect of extending the life of a structure. Thus this issue should not be disregarded. Existing preservation efforts for historical buildings are insufficient without the introduction of ongoing maintenance.

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