

A Study on Common Defect of Heritage Mosque in Kedah, Malaysia

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Abstract: Defect can occur at any heritage building if the building is not maintained properly. A prompt action toward defects must be taken to avoid health and safety from being affected. This study objectives are to recognize the common defect of heritage mosque and to distinguish the possible causes of heritage mosque defect in Kedah, Malaysia. This study used questionnaire as a survey platform. 63 respondents involved were among engineer, architect and contractor that expertized in heritage mosque background. The data collection then generated by using Statistical Package for the Social Sciences (SPSS) version 26 in descriptive analysis. The result of the study is that the common defects of heritage mosque in Kedah was crack defect (46.00 %), leakage defect (30.20 %), dampness defect (11.10 %), peeled paint (7.90 %), insect or termite attack (3.20 %), and spalling (1.60 %). The causes of crack defect were pressure of excessive load (66.70 %), soil analysis and site selection (28.60 %) and rapid exchange of the weather (4.80 %). Next, the cause of leakage defect was cracking of external walls (98.40 %). Last but not least, the cause of peeled paint is was excessive rain and dampness (100.00 %). This study recommends taking an action on quality workmanship in handling heritage mosques in order to increase the level of comfort for user to use them.

Keywords: Mosque, Heritage, Crack, Leakage, Dampness, Peeled Paint, Insect or Termite Attack, Spalling

1. Introduction

Several terms may be used in order to explain the heritage mosque. Although there are many heritage mosques in Malaysia throughout the world, the understanding of practise is unclear or indefinite. In general, a mosque is a place of worship such as praying and iktikaf for Muslims [1]. Heritage is our past that been preserved for the present and it will be inherited for the future generations [2]. Heritage mosques are same as other historic buildings which had also made significant contributions in the history of the country [3]. Old and historical buildings are a symbol of cultural identity and heritage of a certain community of particular [2].

The mosque is a place of worshipping God, such as prayer, specific to the Muslims [13]. Apart from the place of worship, the mosque is also used as a place to gather, discuss and plan strategies that are not just limited to the field of da'wah but also includes trade, legislation, and dissemination of knowledge, and many more [1]. Besides that, mosque also plays a huge role in several aspects such as social, education and administration [15]. It is an institution that bonds people, both physically and spiritually, as a khalifah of Allah [15]. The unique constructions of the mosque as well as the attractive infrastructure are also one of the attractions for domestic and foreign tourists when visiting Malaysia [1].

Heritage should be preserved for the present time and it will be inherited for the future generations [2]. The heritage mosque has the historical value of its own and unique design which can show the characteristics of the local culture [9]. The public is now starting to be aware of the value of heritage buildings as a limited resource that forms part of the urban scenery as well as a tourism landmark and attraction [14]. Heritage buildings also can be categorized as a limited resource of architectural heritage that can be seen in our built environments [2]. Many of the heritage buildings have being left neglected [16]. Thus, it leading to premature abandonment and demolition.

Defect is a building flaw or design mistake that reduces the value of the building and causes a dangerous condition [4]. Build defects occur either new or old buildings [5]. The defects are leakage, cracks, peeled paint, spalling, salt attack, insect or termite attack, dampness and moisture, decayed, growth of fungus, moss or small plant, missing or broken parts, and erosion of mortar joints [9]. There are two types of building defects which are structural defect and non-structural defect. Structural defect means any defect in a structural element of a building that is attributable to defective design, defective or faulty workmanship or defective material and sometimes any combination of these [6]. Structural defects are defect in the structural element such as beam, column etc [7]. Non-structural defect includes defect in brick work, dampness in old structures, and defects in plaster works [6].

1.1 Problem Statement

Old mosques are affected by defects and deterioration agents that cause them to degenerate [8]. Various defects are more common in an old structure [6]. The overall of 85.00 % of the heritage mosque is still being used and the remainder is either being repaired or left empty and most of the damage and defects in the building is at the roof area (36.00 %), followed by the wall (25.00 %), column (13.00 %), windows (11.00 %), doors (8.00 %), household (3.00 %) flooring (2.00 %) and beam (2.00 %) [3]. Normally, there are many problems of defects which are common to the heritage building parts such as roofs, walls, floors, ceilings, toilets, doors, and windows [10]. The defect can occur at any heritage building if the building is not maintained properly [9]. Lack of routine maintenance is the primary cause of building defects [8].

An incident of a dome tower collapsed took place around 10.30 pm at the Haji Muhammad mosque, Kampung Mengabang Tengah. Haji Muhammad mosque located in Kuala Terengganu. Four members of a mosque congregation cheated death when they were nearly hit by a dome tower that collapsed. Three members were reciting the Quran while another member was folding prayer mats within 3m of the collapse [11]. The 100-year-old private mosque was undergoing refurbishment works since many parts of its wooden building had rotted and the roof was leaky [12]. A prompt action toward defects must be taken. This is because defects affect the health and safety [7].

1.2 Research Objectives

The objective of this study is to recognize the common defect of heritage mosque and to distinguish the possible causes of heritage mosque defect.

2. Materials and Methods

This study used questionnaire as a survey platform. 63 respondents involved were among engineer, architect and contractor that expertized in heritage mosque background. The data collection then generated by using Statistical Package for the Social Sciences (SPSS) version 26 in descriptive analysis. sub-sections are participants, instrument, data collection and data analysis. Figure 1 shows a flowchart research methodology for this study. The flow chart illustrates the phases to perform this study.

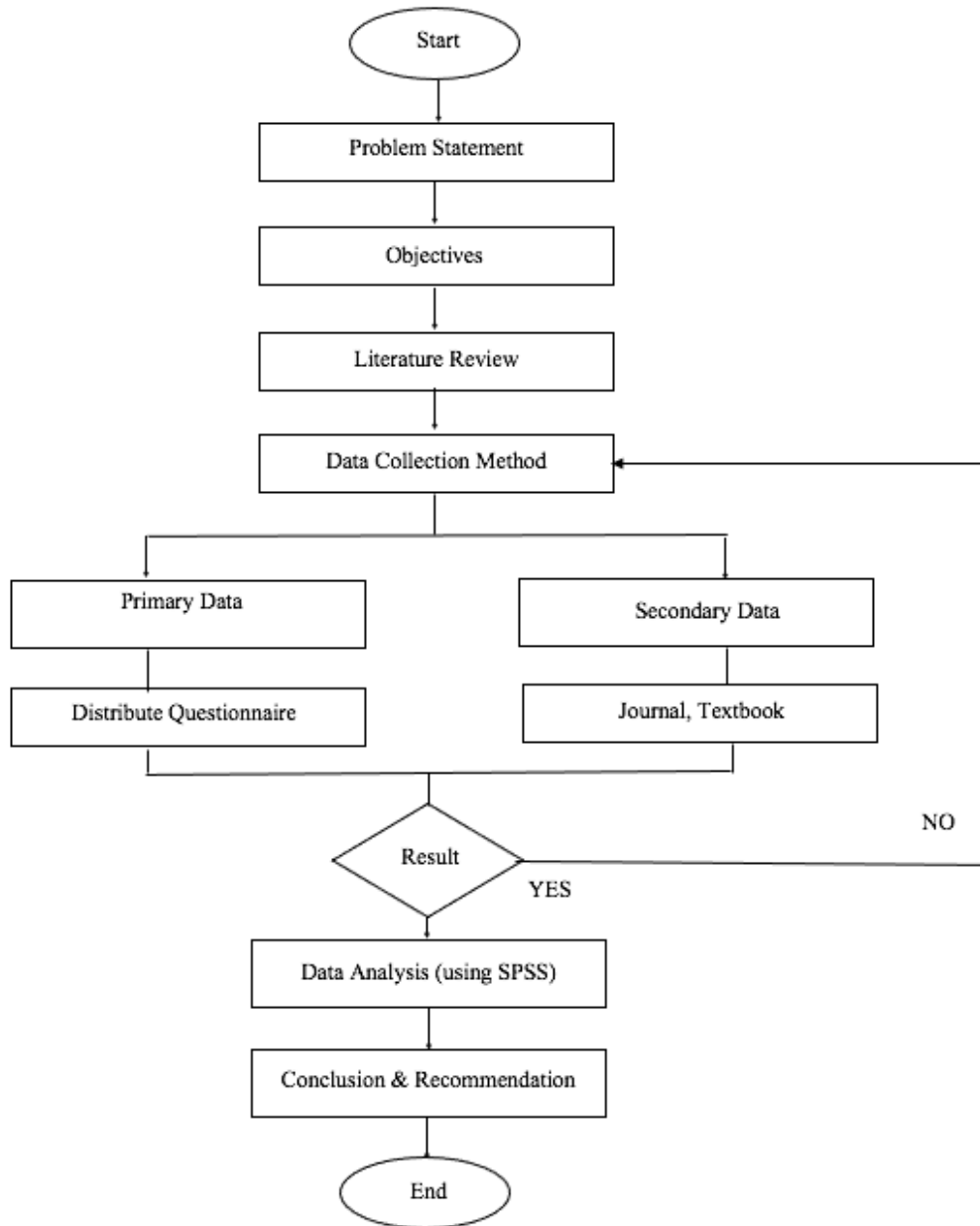


Figure 1: Flowchart research methodology

3. Results and Discussion

This section is focus demography of respondents, common defects of heritage mosque and possible causes of heritage mosque. This section is conducted to discuss the result of common defect of heritage mosque and possible causes of heritage mosque defect.

3.1 Demography of Respondents

From demographic of respondent part, the gender involved 90.50 % male and 9.50 % female. Next, the highest percentage of age group was 31-40 years old (46.00%), followed by 20-30 years old (27.00 %), 41-50 years old (14.30 %) and lastly 51 years old and above (12.70 %). The designation of engineer (66.70 %) was highest, architect (30.20 %) and contractor (3.20 %) were lowest. The highest education level of all respondents was degree (100.00 %).

3.2 Common Defects of Heritage Mosque

This study recognized the common defects of heritage mosque (Table 1). Based on result, the common defects in heritage mosque are leakage, cracks, peeled paint, spalling, insect or termite attack, and dampness. The highest percentage of common defects was crack defect (46.00 %), followed by leakage defect (30.20 %), dampness defect (11.10 %), peeled paint (7.90 %), insect or termite attack (3.20 %), and spalling (1.60 %). The most common defect in heritage mosque was crack defect. Crack defect located at common area such as exterior walls, interior walls, windows and ceilings. For example, the crack defect for interior walls spotted at corners of doors. Other than that, crack defect located on column, beam, roof and staircase of the heritage mosque. Secondly, leakage defect. Leakage defect has been seen on some parts of roof and domes in heritage mosque. However, not all heritage mosque has leakage defect. This is because not all elements of the building consisted of water passage. Thirdly, dampness defect. Heritage mosque has dampness defect on walls and floors due to high water content in the components especially timber. Exposure of dampness defect caused components in heritage mosque to decay. These components were included window, door and floor. Heritage mosque that located near to water source has greater risk to dampness defect.

Besides that, heritage mosque has peeled paint defect. Peeled paint defect detected on mosque facade. Peeled paint specifically appeared in plastered walls, ceilings, beam and column. Location of heritage mosque contributed higher potential for peeled paint defect. The location was included near the sea. Peeled paint defect was visible on the exterior walls. However, peeled paint defect also occurred at internal walls. Mostly occurred on the walls, internal or external [10]. On the other hand, insect or termite attack defect. Termites are small, pale to brownish black in color, insect that capable of feeding on mostly anything including timber [6]. Insect or termite attack defect infestation poses a threat to damp. This defect also infestation poses a threat to digestible timber found in wall plates, the feet of rafters, bearing ends of beam and trusses. The timbers were placed against or built into damp walling. Lastly, the least common defect in heritage mosque was spalling defects. Spalling of masonry walls leaved the wall with a thinner cross section. Some of spalling defect was in the beams and columns caused structural failure and damaged to the heritage mosque.

Table 1: Common defects of heritage mosque

Common defects in heritage mosque	Frequency	Percentage (%)
Leakage	19	30.20
Cracks	29	46.00
Peeled paint	5	7.90
Spalling	1	1.60
Insect or termite attack	2	3.20
Dampness	7	11.10
Total	63	100.00

3.3 Possible Causes of Heritage Mosque

The factors of crack defect (Table 2) were pressure of excessive load, soil analysis and site selection and lastly extreme and rapid exchange of the weather. From the result, the highest percentage of crack defect factor was pressure of excessive load (66.70 %). The lowest percentage of crack defect factor was extreme and rapid exchange of the weather (4.80 %). Pressure of excessive load has two types.

The types of pressure excessive load are live load and dead load. Next, concrete defect due to extreme and rapid exchange of the weather. The weather changed rapidly from cold to hot made the concrete to expands and shrinks. Hence, concrete defect occurred.

Table 2: Factors of crack defect

Factors of crack defect	Frequency	Percentage (%)
Pressure of excessive load	42	66.70
Soil analysis and site selection	18	28.60
Extreme and rapid exchange of the weather	3	4.80
Total	63	100.00

The previous review from literature stated leakage defect was possibly caused by cracking of external walls. The cause of leakage defect was shown in Table 3. Hence, the result showed 98.40 % was agreed with the given statement. Meanwhile, the rest of 1.60 % disagreed. The crack of external walls affected the water pipes. Hence, it caused leakage defect. Leakage defect also occurred due to crack in water passage, decayed, and broken or missing part of the building.

Table 3: Cause of leakage defects

Do you think leakage defect is caused by cracking of external walls?	Frequency	Percentage (%)
Yes	62	98.40
No	1	1.60
Total	63	100.00

Last but not least, the cause of peeled paint (Table 4) was caused by excessive rain and dampness. From the result, 100.00 % agree that the cause of peeled paint was excessive rain and dampness. The excessive rain and dampness effected the building facades. The peeled paint was visible on the exterior walls. The building facades of peeled paint mostly located near to the sea.

Table 4: Cause of peeled paint defect

Do you think peeled paint defect is caused by excessive rain and dampness?	Frequency	Percentage (%)
Yes	63	100.00
No	0	0.00
Total	63	100.00

4. Conclusion

In conclusion, common defects of heritage mosque in Kedah were crack defect (46.00 %), leakage defect (30.20 %), dampness defect (11.10 %), peeled paint (7.90 %), insect or termite attack (3.20 %), and spalling (1.60 %). The causes of crack defect were pressure of excessive load (66.70 %), soil analysis and site selection (28.60 %) and rapid exchange of the weather (4.80 %). Next, the cause of leakage defect was cracking of external walls (98.40 %). Last but not least, the cause of peeled paint is was excessive rain and dampness (100.00 %). This study recommends taking an action on quality workmanship in handling heritage mosques in order to increase the level of comfort for user to use them.

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