Available online at
http://journal.uitm.edu.my/ojs/index.php/BEJ

e-ISSN: 2637-0395

Built Environment Journal 22(1) 2025, 56 - 70.

Built Environment Journal

Determining the Key Elements in Maintenance Planning of the Masjid Kariah in Malaysian Perspective

Azhar Yusof[1*], Mohammad Ridzuan Yahya[2], Mohd Saidin Misnan[3]

[1]*Institute of Graduate Studies, Universiti Teknologi MARA, 40450 Shah Alam, Selangor, Malaysia*
[2]*School of Real Estate & Building Surveying, College of Built Environment, Universiti Teknologi MARA, 40450 Shah Alam, Selangor, Malaysia*
[3]*Faculty of Built Environment and Surveying, Universiti Teknologi Malaysia, 81310 UTM Johor Bahru, Johor, Malaysia*

ARTICLE INFO

Article history:
Received 29 February 2024
Revised 30 April 2024
Accepted 05 July 2024
Online first
Published 01 January 2025

Keywords:
Masjid Kariah,
Maintenance Strategy Criteria,
Maintenance Performance Measurement,
Delphi Survey,
Malaysia

DOI:
10.24191/bej.v22i1.928

ABSTRACT

In Malaysia, mosques encounter various maintenance-related challenges including limited financial resources, a shortage of skilled labour, and the necessity to reconcile traditional architectural and design elements with modern building techniques specifically for Masjid Kariah. Non-existence of formal measurement criteria for efficient Masjid Kariah maintenance planning has led to the aim of this study, which was to determine the key elements in maintenance planning of the Masjid Kariah in a Malaysian perspective. The qualitative approach was employed in this study through a Delphi survey where semi-structured interviews were conducted to 11 experts from academicians, maintenance practitioners and governments' sectors. The formation of conceptual framework through reviewing previous studies has helped the identification of the key elements. Thus, the results revealed that all 11 experts have been agreed and validated establishing 10 key elements in maintenance planning, which are Planned Preventive Maintenance, Planned Corrective Maintenance, Corrective Maintenance, Organisation Management, Planning and Scheduling, Financial Provision, Service Quality, Assessment, Resources Allocation and Safety and Health specifically for the Masjid Kariah. Hence, the stakeholders can develop a holistic maintenance planning based on those 10 key elements for Masjid Kariah. In conclusion, the combination between maintenance strategy and maintenance performance measurement can foster a good practice for maintenance planning.

[1*] Corresponding author. *E-mail address*: azharbinyusof@gmail.com
https://doi.org/10.24191/bej.v22i1.928

INTRODUCTION

The global Muslim population had remarkably increased from 570 million in the 1970s to 1.9 billion by 2020 (Johnson & Crossing, 2020), surpassing the global population growth rate. The most notable increase occurred in Asia, with Malaysia emerging as the second-largest Muslim nation in Southeast Asia. Within this demographic shift, there's a designated space for Muslims to conduct their prayers, commonly known as a mosque or Masjid in the Malaysian language, defined as "a place for prostration (Sofii & Pertiwi, 2021; Hassan et al., 2021; Shoemaker, 2021).

In Malaysia, where the Muslim population surpasses 19 million and is supported by over 6000 mosques, a variety of mosque types cater to the diverse needs of both urban and rural residents. The Department of Islamic Development Malaysia (2021) classifies mosques into four levels: National Mosque, State Mosque, District Mosque and Community Mosque or Masjid Kariah. Notably, Masjid Kariah, the most prevalent type, is established in every small district across all states of Malaysia (Department of Islamic Development Malaysia, 2021) (See Fig. 1). Previous research has mainly focused on maintenance planning for State Mosques and District Mosques, often overlooking the maintenance needs of Masjid Kariah due to resource constraints. Therefore, this study aims to bridge this gap by examining maintenance planning specifically from the perspective of Masjid Kariah. By concentrating on the maintenance requirements of Masjid Kariah, this study seeks to develop a conceptual framework utilizing indicators from maintenance strategy criteria and performance measurements to address the unique challenges and circumstances faced by these mosques. Despite their significance, mosques in Malaysia encounter various maintenance-related challenges, including limited financial resources, a shortage of skilled labour, and the necessity to reconcile traditional architectural and design elements with modern building techniques (Hamdan et al., 2023).

Additionally, an inevitable need for maintenance in buildings, including mosques, to ensure their functionality over their lifespan. Maintenance plays a critical role in ensuring that Masjid Kariah, like other types of mosques, continues to offer a conducive environment for daily religious activities. It is a religious duty to maintain the mosque to fulfil its purpose as a place of worship. Hence, proper maintenance planning is vital to preserve the facilities of Masjid Kariah and ensure uninterrupted services, considering the daily utilisation of these facilities. This aligns with the primary aim of this study which is to identify the key elements in the maintenance planning of Masjid Kariah from a Malaysian perspective, focusing on seven indicators of Maintenance Performance Measurement concerning Maintenance Planning via Maintenance Strategy Criteria.

MAINTENANCE PLANNING IN MASJID KARIAH's PERSPECTIVE

The implementation of British Standard 3811 (1993) for building maintenance management has become essential in maintenance planning across various building types, including offices, hospitals, high-rise apartments, and factories. Maintenance encompasses all technical and administrative efforts, including supervision, aimed at preserving or restoring an item to a functional state that fulfils its intended purpose. Maintenance planning involves a series of activities focused on replacing components or groups of components affected by wear and tear. This phase occurs after occupancy and represents the longest lifecycle stage of a project, coinciding with the building's most intensive period of use, significantly influencing both initial design and construction costs.

Maintenance is crucial for various building types including mosques, regardless of their size, complexity, or location. Proper maintenance planning is important for Masjid institutions, to ensure operational efficiency and longevity because Masjid institutions are essential places with religious facilities for Muslims' daily worship. Therefore, it is imperative for Masjids to provide excellent facility services to facilitate all programmes organised by the mosque committee. Masjid institutions can be classified into five

https://doi.org/10.24191/bej.v22i1.928

levels: universal, national, state, district, and community. Fig. 1 illustrates the Masjid institutional levels from the Malaysian perspective.

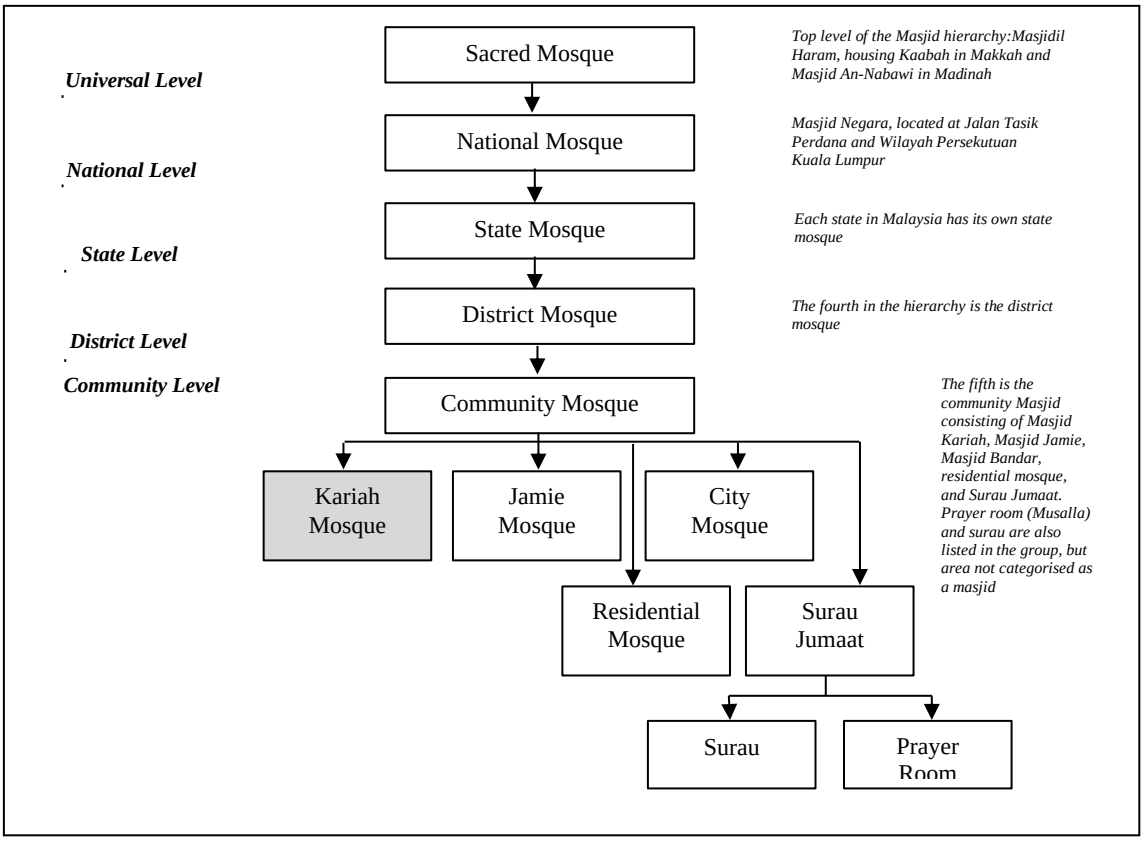

Fig. 1. Masjid Institution Level in the Malaysian Perspective (the shaded box indicates the type of Masjid focused in this study)

Source: Adapted from the Department of Islamic Development Malaysia (2021)

Masjid Kariah is a small local mosque with multiple functions in the village or a small community to sustain the Muslim population in an area (Ahmad et al., 2020). Currently, the overseeing of each Masjid Kariah falls under the jurisdiction of its respective State Islamic Religious Council, known as 'Majlis Agama Islam Negeri' (e.g., MAIS, MAINS and MAIK). These councils are also responsible for supervising all activities associated with Masjid Kariah, including maintenance tasks. Masjid Kariah was established with the primary purpose of ensuring the provision of protection, security, and harmony for its users, as the Muslim community relies on Masjid Kariah to conduct their religious practices. In order to ensure the continuous provision of quality facilities to users throughout the life cycle of this institution, maintenance works must be regularly carried out to upkeep its condition. This responsibility involves active participation from the committee members of Masjid Kariah itself in managing the maintenance tasks.

Regular maintenance is essential to uphold the mosque's efficiency and usability, ensuring its facilities remain in good condition. However, the maintenance of mosques poses challenges, as local authorities and most mosque organisations often do not prioritise maintenance planning. Consequently, many mosques are underutilised, leading to gradual decay, dilapidation, and deterioration due to lack of or

https://doi.org/10.24191/bej.v22i1.928

improper maintenance. Moreover, funds allocated for maintenance works in mosque building facilities were often insufficient. Announced in the 2023 Malaysian budget speech by the then Finance Minister, on October 7th, 2022, the allocation for repair and maintenance works on infrastructure was focused more on schools, with a mere Ringgit Malaysia 1.1 Billion to fund over ten thousand schools in Malaysia. As Fig. 2 shows several examples of Masjid Kariah in Malaysia with some in better conditions than others this signifies that the mosques must be well-maintained to enable the community to perform daily worship and other religious-related activities conveniently and comfortably.

Masjid Kariah in Negeri Sembilan

Masjid Kariah in Kelantan

Masjid Kariah in Melaka

Masjid Kariah in Terengganu

Fig. 2. Examples of Masjid Kariah in Malaysia

Source: Authors (2024)

Therefore, a conceptual framework of Masjid Kariah maintenance planning is needed to help building maintenance management and committee members deal with building maintenance issues, especially for the Masjid Kariah as well as facilitate the application for allocation funds for the maintenance costs of the Masjid Kariah to the government. Based on previous studies, formal maintenance measurement criteria for Masjid Kariah are still not available from the Malaysian perspective. Hence, this has led to a research gap in this study as the non-existence of formal maintenance measurement criteria for efficient maintenance planning of Masjid Kariah. In this study, the indicators of maintenance planning (maintenance strategy criteria) and maintenance performance measurements were implemented as dependent and independent variables. These indicators were integrated into the conceptual framework of Masjid Kariah maintenance planning. This approach was constructed based on a study by Swanson (2001) which revealed a strong positive correlation between proactive and aggressive maintenance strategies and building maintenance performance measurements in the metalworking industry.

https://doi.org/10.24191/bej.v22i1.928

Maintenance Planning (Maintenance Strategy Criteria) Indicator

The efficacy and efficiency of maintenance planning are significantly influenced by the types of maintenance strategies employed (Ding & Kamaruddin, 2015). A good maintenance strategy aims to provide a clear direction for achieving the organisation's objectives through a structured and easily navigable approach (Waeyenbergh & Pintelon, 2002). Numerous maintenance strategy criteria should be carefully evaluated to ensure alignment with organisational goals because the evaluation process helps to identify shortcomings in the maintenance planning, prompting suitable modifications if desired outcomes are not achieved. This study adopted a maintenance strategy that is in accordance with British Standard 3811 (1993), which outlines three primary criteria: planned preventive maintenance, planned corrective maintenance, and unplanned maintenance. The aim is to enhance Masjid Kariah's maintenance planning in terms of maintenance performance measurement. These three main criteria serve as dependent variables in this study. Fig. 3 shows the overview of maintenance strategy in buildings based on British Standard BS3811 (1993).

a) **Planned preventive maintenance:** Planned preventive maintenance is defined as significant repairs structured and executed according to pre-established plans, utilising records to ensure efficiency. It differs from day-to-day repair services as it aims to maintain buildings in a modern, safe, and comfortable condition (Wang et al., 2007; Swanson, 2001; Ruparathna et al., 2018; Loosemore & Hsin, 2001; Seeley, 1987). The primary objective of planned preventive maintenance is to minimise the need for emergency repairs or maintenance work. It is systematically organised, planned, and executed with control, utilising records according to predetermined plans. Its application aims to minimise defective work or prevent the occurrence of emergencies. There are two (2) types of planned preventive maintenance: (i) planned preventive scheduled maintenance and (ii) planned preventive condition-based maintenance. Al-Najjar & Alsyouf (2003) highlighted that the key objective of this strategy is to reduce the number of failures by conducting maintenance work either according to schedule or based on condition.

b) **Planned corrective maintenance:** Planned corrective maintenance is the simplest type of maintenance strategy, involving the use of building elements or services until they experience a breakdown. Upon failure, maintenance work is undertaken to repair the damage to an item, allowing it to resume its intended function. This strategy is commonly employed in building maintenance management as it encompasses all activities related to the replacement or repair of elements (Waeyenbergh & Pintelon, 2002; Nilsson & Bertling, 2007).

c) **Unplanned maintenance:** Unplanned maintenance involves work without prior planning. This strategy is only employed when the building experiences unforeseen damage, such as natural disasters or accidents like fires that affect its structure or architecture. It entails unexpected repairs to the building without any initial planning (Rani et al., 2015)

https://doi.org/10.24191/bej.v22i1.928

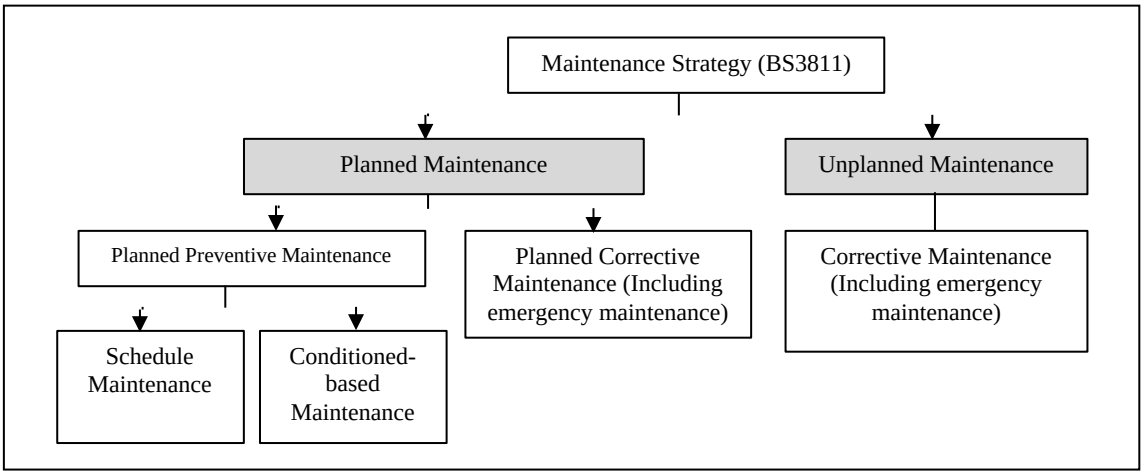

Fig. 3. The Overview of Maintenance Strategy in Buildings based on British Standard 3811 (1993) (the shaded box shows maintenance strategy criteria employed in this study)

Source: British Standard 3811 (1993); Seeley (1987)

Maintenance Performance Measurement Indicator

Maintenance performance measurement involves quantifying the efficiency and effectiveness of activities carried out following maintenance actions. Amaratunga & Baldry (2002) further elaborate on this concept, defining performance measurement as a tool used to evaluate the strengths and weaknesses of maintenance planning. Consequently, the results of maintenance performance measurement can be utilised to assess the effectiveness of maintenance strategies. Drawing from the general Maintenance Management Model (Tsang et al., 1999), Performance Measurement Model (Cholasuke et al., 2004), and previous studies related to maintenance performance measurement (Sapril et al., 2016; Ku & Kim, 2019), maintenance performance measurement needs to be tailored to suit Masjid Kariah maintenance planning from a Malaysian perspective. Fig. 4 shows the Maintenance Performance Measurement for Masjid Kariah with seven indicators included as follows:

a) **Organisation Management**: A critical construct for the implementation of maintenance strategy. Within this sub-indicator, factors such as policy deployment, human resources management, and continuous improvements were examined in this study. These elements play pivotal roles in ensuring the effective execution of maintenance strategies within an organisation, particularly in the context of Masjid Kariah maintenance planning.

b) **Planning and Scheduling**: Referred to as the planning, arranging, controlling, and optimizing work within a specific timeframe; the sub-indicator for Planning and Scheduling includes factors such as maintenance approach, record management, and communication, which have been reviewed for this study. These components are essential for the effective planning and execution of maintenance tasks within the Masjid Kariah context, ensuring that tasks are carried out efficiently and on schedule.

c) **Financial Provision**: Referred to as the budget and cost aspect, the sub-indicator for Financial Provision encompasses factors such as budget adequacy, fund efficiency, and fund allocation, which were evaluated in this study. These elements are crucial for ensuring that sufficient financial resources are allocated to support maintenance works within Masjid Kariah, facilitating effective upkeep and management of the facilities.

https://doi.org/10.24191/bej.v22i1.928

d) **Service Quality**: This plays a crucial role in customer satisfaction for those utilizing the facilities. The sub-indicator for Service Quality includes factors such as reliability, assurance, tangibility, empathy, and responsiveness, all of which have been considered for this study. These components are essential for ensuring that users of Masjid Kariah facilities experience high-quality service, fostering satisfaction and trust in the community.

e) **Assessment**: Routine assessment is essential to warrant a sustainable asset that serves the purpose of the building construction and physical aspects of the building are in good condition, including structural works, architectural features, facades, space utilisation, heating, lighting, energy efficiency, and maintainability. Hence, factors such as assessment of building condition, assessment of service condition, and compliance with statutory obligations, were examined under this sub-indicator. These components are critical for evaluating the overall condition and performance of Masjid Kariah facilities, aiding in the identification of areas requiring attention and improvement to maintain their sustainability.

f) **Resources Allocation**: Defined as the allocation, distribution, and monitoring of financial, human, time, and technical resources to support activities aligned with goals and objectives, a crucial role in maintenance planning. The sub-indicator includes factors such as contract-out management, spare part management, and tools and equipment management, all of which have been reviewed in this study. These elements are essential for effectively managing resources within Masjid Kariah maintenance works, ensuring that necessary resources are available and utilised efficiently to achieve desired outcomes.

g) **Safety and Health**: The primary objective of developing buildings is to fulfil the needs of occupants by providing a conducive, safe, comfortable, healthy, and secure environment for various activities, including work, study, leisure, family life, and social interactions. This sub-indicator focuses on safety and health elements that are crucial for ensuring the well-being and security of individuals using Masjid Kariah facilities, promoting a safe and healthy environment for all occupants.

https://doi.org/10.24191/bej.v22i1.928

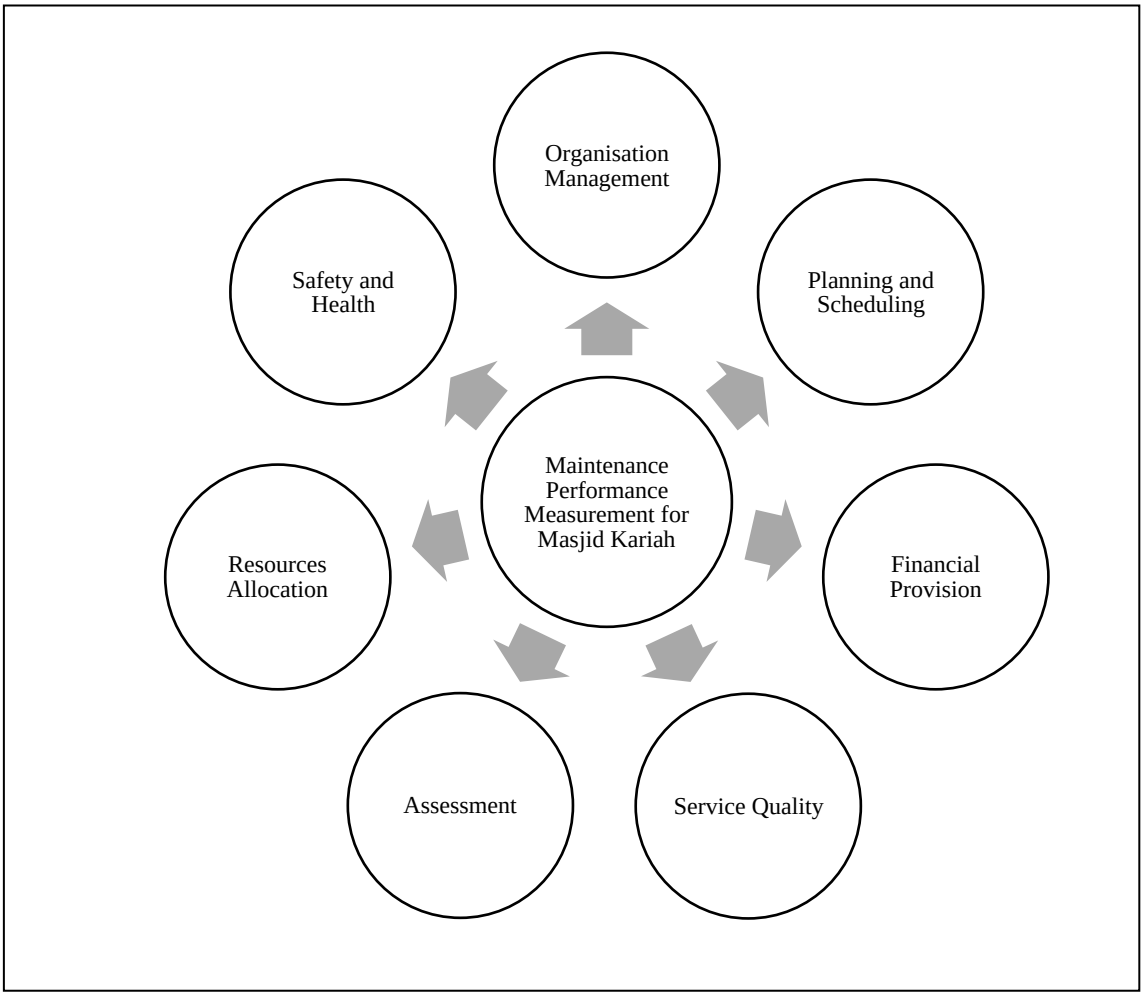

Fig. 4. The Maintenance Performance Measurement for Masjid Kariah

Source: Authors (2024)

Conceptual Framework's Development

In achieving the aims of this study, the conceptual framework has been developed by adopting seven (7) indicators of Maintenance Performance Measurement concerning Maintenance Planning via Maintenance Strategy Criteria as mentioned. The conceptual framework consists of one dependent variable (maintenance planning: maintenance strategy criteria) and seven (7) independent variables (maintenance performance measurement: organisation management, planning and scheduling, financial provision, service quality, assessment, resources allocation and safety and health) towards maintenance management planning as identified in this study. Fig. 5 shows the conceptual framework's development with key elements in maintenance planning for the Masjid Kariah from a Malaysian perspective.

https://doi.org/10.24191/bej.v22i1.928

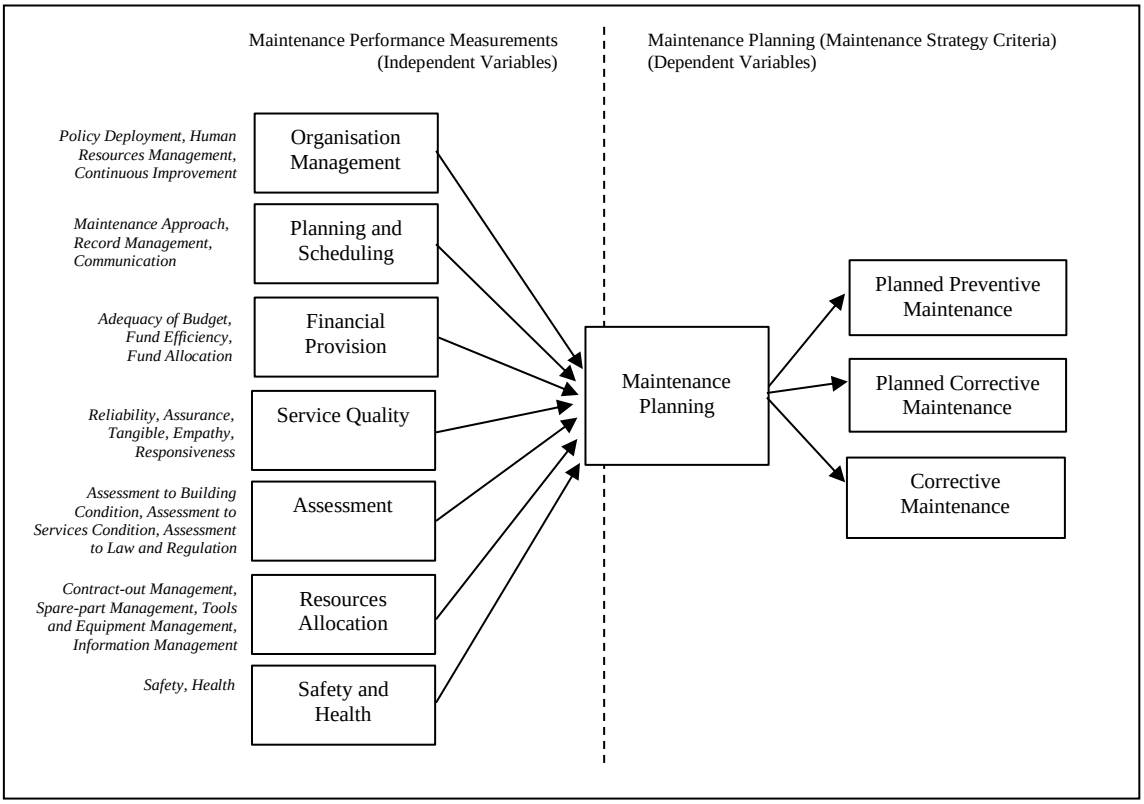

Fig. 5. The Conceptual Framework's Development with Key Elements in Maintenance Planning of the Masjid Kariah in a Malaysian Perspective.

Source: Authors (2024)

METHODOLOGY

This study was been divided into two (2) steps where in the first step, the most relevant indicators and sub-indicators for selecting key elements in maintenance management planning of the Masjid Kariah were identified through a comprehensive review of the existing scholarly literature on the subject was conducted and has been interpreted in the literature review section. In the second step, a Delphi survey was carried out through two (2) rounds of semi-structured interviews with 11 field experts comprising of academicians (four (4) experts), maintenance practitioners (two (2) experts), and officers from governmental agencies, the Malaysian Public Works Department (*'Jabatan Kerja Raya'*, two (2) experts) and '*Unit Pengurusan Masjid Daerah'* (two (2) experts), to identify the most relevant elements (indicators and sub-indicators) that experts deemed important in the maintenance management planning of the Masjid Kariah in the Malaysian perspective. The selection of the experts was based on their current position in their respective organisation position and professional expertise in masjid maintenance having more than five (5) years of experience. This study postulates three (3) initial attributes for maintenance strategy criteria and 22 initial dimensions (sub-indicators) for seven (7) maintenance performance indicators. The probable attributes of maintenance strategy criteria and maintenance performance measurements were extracted from the literature and were then finalised with the supervisor before being sent for an expert review. The data obtained from the Delphi survey through a semi-structured interview was analysed through qualitative content analysis using the transcribed text, sorted and classified according to the attributes interviewed. Then, the findings have been summarised based on the survey's objectives. Table 1 shows the profile of

https://doi.org/10.24191/bej.v22i1.928

the experts involved in the Delphi survey. Identifying the most relevant indicators and sub-indicators could overcome the knowledge gap of non-existent formal measurement criteria for efficient Masjid Kariah maintenance planning.

Table 1. Profile of Expert involved in the Delphi survey

No.	Expert	Organisational Position	Experience in Building Maintenance	Experience in Masjid Maintenance	Certification/Years of Experience in Maintenance
Academician					
1.	Expert 1	UiTM Shah Alam	/	/	> 25 years
2.	Expert 2	Massey University, New Zealand	X	/	> 30 years
3.	Expert 3	UTM Skudai	/	/	> 30 years
4.	Expert 4	UiTM Shah Alam	/	/	> 30 years
5.	Expert 5	UTM Skudai	/	/	> 10 years
Maintenance Practitioner					
6.	Expert 6	K Builders Sdn. Bhd.	/	/	> 10 years
7.	Expert 7	Maintenance Practitioner (Contractor Masjid)	/	/	> 20 years
Jabatan Kerja Raya (JKR)					
8.	Expert 8	Engineer (HOPT JKR)	/	X	> 5 - 10 years
9.	Expert 9	Maintenance Officer	X	/	> 5 - 10 years
Unit Pengurusan Masjid Daerah (UPMD)					
10.	Expert 10	Tuan Kadi Majlis Agama Islam Tanah Merah/ Unit Pengurusan Masjid Daerah	X	/	> 5 - 10 years
11.	Expert 11	Officer/Imam Tua JAHEAIK	X	/	> 10 years

Source: Authors (2024)

FINDINGS AND DISCUSSION

The Delphi survey was conducted twice to validate the important indicators for maintenance planning (maintenance strategy criteria) and maintenance performance measurements. In the first round of the survey, data extracted from the literature was incorporated into the interview questions to obtain refinement of all essential attributes. A Google Form was created for the questionnaire to allow the selected expert to complete an additional assessment based on the proposed maintenance strategy criteria and maintenance performance measurements. Hence, the following three objectives could also be achieved (1) to investigate the interest, experience and willingness of the experts to be part of the Delphi survey process, (2) to familiarise the experts with the framework derived from the literature review and (3) to explain each maintenance strategy criteria and maintenance performance measurement. The second round of the Delphi survey was executed to enhance the consistency and accuracy of measurements with the following two main objectives: (1) to seek honest feedback from experts regarding the reliability of the attributes provided for the next stage of research, and (2) to validate improvement on the framework based on the feedback gathered from the first survey interview. Table 2 shows the summary of expert feedback from two (2) rounds of semi-structured interviews.

Table 2. Summary of Expert from Semi-structured Interview

https://doi.org/10.24191/bej.v22i1.928

No.	Item	Objective	Summarised Results derived from the Synthesis of Feedback provided by Experts
1.	First round experts' interview	To investigate the interest, experience and willingness of the experts to be part of Delphi survey process	The experts do agree with the involvement during Delphi survey process but do not promise to deliver the feedback on specific times
		To familiarise the experts on the framework derived from literature review	The experts closely reviewed the document presented to them and understood the roles that were expected from them to give views and opinions regarding the framework
		To explain each maintenance strategy criteria and maintenance performance measurement	Experts were given explanation regarding each of the maintenance strategy criteria and the maintenance performance measurements contained in the framework and understood the purpose to create the framework of maintenance strategy criteria and maintenance performance measurements
2.	Second round experts' interview	The researcher asks for honest feedback from experts regarding the reliability of the attributes provided for the next stage of research	The maintenance strategy criteria and maintenance performance measurements provided by the researcher can be understood by the experts
			All maintenance strategy criteria were agreed by all experts and most element of maintenance performance measurements attributes were also agreed by most experts
		Feedback gathered from the first interview will have the primary usage to improve the framework and used in the second round of interview	All experts believe that the frameworks that were formulated from the literature review were good enough to be used in the next stage of the research

Source: Authors (2024)

Based on Table 2 above, the results indicated that in both rounds of interviews, all experts have reached a consensus and validated the establishment of all key elements in maintenance planning involving maintenance strategy criteria and maintenance performance measurements, specifically for Masjid Kariah from a Malaysian perspective. The significance of the findings from the seven indicators of maintenance performance measurement (organisation management, planning and scheduling, financial provision, service quality, assessment, resources allocation, and safety and health) lies in their ability to comprehensively evaluate the effectiveness and efficiency of maintenance work within the Masjid Kariah. By examining these indicators, stakeholders can assess various aspects of maintenance management, including organisational efficiency, financial sustainability, service quality, and compliance with safety and health standards. These findings provide insights into areas of strength and areas needing improvement, guiding decision-making processes to enhance overall maintenance performance. This result is in line with supported by several previous studies by Sapril et al. (2016), Ku & Kim (2019), Parida & Kumar (2009), Cholasuke et al. (2004), Brown et al. (1994), supports maintenance performance measurement needs to be tailored to suit Masjid Kariah maintenance planning from a Malaysian perspective. On the other hand, the significance of the findings from the three indicators of Maintenance Strategy Criteria (planned preventive maintenance, planned corrective maintenance, and unplanned maintenance) lies in their role in determining key elements in maintenance planning for Masjid Kariah in the Malaysian perspective. These indicators help in shaping maintenance strategies by outlining approaches for preventive, corrective, and reactive maintenance works. Understanding these criteria enables stakeholders to develop targeted maintenance plans tailored to the specific needs and requirements of Masjid Kariah, thereby ensuring the effective and sustainable management of its facilities. Suggest removing it because redundant. The author has already mentioned the same sentence without any additional elaboration on the point.

The significance of these findings underscores the importance of comprehensive maintenance planning for Masjid Kariah in Malaysia. By considering both the maintenance performance measurement indicators and the maintenance strategy criteria, stakeholders can develop holistic maintenance plans that

address organisational, financial, operational, and safety aspects. This approach ensures the efficient utilisation of resources, the provision of high-quality services, and the creation of a safe and conducive environment for worshippers and community members. Ultimately, these findings contribute to the sustainable management and preservation of Masjid Kariah facilities, fulfilling their essential role in serving the needs of the Muslim community in Malaysia. This study has been supported by Swanson's (2001) study in the metalworking industry, where she empirically investigated the relationship between maintenance strategy and maintenance performance measurements. Swanson's study revealed a strong positive correlation between proactive and aggressive maintenance strategies and building maintenance performance measurements.

Therefore, the results of the study have successfully achieved the aim of identifying the key elements in maintenance planning for Masjid Kariah from a Malaysian perspective. Through the consensus of experts, a conceptual framework has been established, with maintenance strategy criteria serving as dependent variables and maintenance performance measurements (organisation management, planning and scheduling, financial provision, service quality, assessment, resources allocation, and safety and health) serving as independent variables. This framework provides a structured approach to maintenance planning, addressing various aspects crucial for effective maintenance management in Masjid Kariah facilities. Overall, the agreement among experts on this framework validates its utility and relevance in the context of Malaysian Masjid Kariah maintenance planning.

CONCLUSION

Through the consensus of experts, a conceptual framework has been developed, incorporating both dependent variables (maintenance strategy criteria) and independent variables (maintenance performance measurements). This framework provides a structured approach to maintenance planning, addressing various aspects crucial for effective maintenance management in Masjid Kariah facilities. Overall, the agreement among experts on this framework validates its utility and relevance in the context of Malaysian Masjid Kariah maintenance planning. Several main points can be concluded in this study:

a) **Identification of Key Elements:** The study successfully identified the key elements in maintenance planning for Masjid Kariah from a Malaysian perspective. This was achieved through a comprehensive review of the literature and two rounds of the Delphi survey involving experts from various relevant fields.
b) **Conceptual Framework Development:** A conceptual framework was developed based on the consensus of experts, incorporating maintenance strategy criteria as the dependent variables and maintenance performance measurements as the independent variables. This framework provides a structured approach to maintenance planning for Masjid Kariah, addressing various aspects crucial for effective maintenance management.
c) **Significance of Findings:** The results from assessing the maintenance performance measurement indicators and maintenance strategy criteria are significant in comprehensively evaluating maintenance works within Masjid Kariah. They provide insights into areas of strength and areas needing improvement, guiding decision-making processes to enhance overall maintenance performance and form maintenance strategies tailored to the specific needs of Masjid Kariah.
d) **Holistic Maintenance Planning:** By considering both maintenance performance measurement indicators and maintenance strategy criteria, stakeholders can develop holistic maintenance plans that address organisational, financial, operational, and safety aspects for the Masjid Kariah. This approach ensures the efficient utilisation of resources, provision of high-quality services, and creation of a safe environment for worshippers and community members.
e) **Validation of Framework:** The agreement among experts on the developed conceptual framework validates its utility and relevance in the context of Malaysian Masjid Kariah maintenance planning. It provides a valuable tool for stakeholders to effectively manage and

https://doi.org/10.24191/bej.v22i1.928

preserve Masjid Kariah facilities, fulfilling their essential role in serving the needs of the Muslim community in Malaysia.

In addition, based on the findings presented in this study, the previously identified research gap that led to this study has been resolved with the formation of a conceptual framework for maintenance planning of the Masjid Kariah from the Malaysian perspective via determining its significant key elements.

ACKNOWLEDGEMENT

The authors express their gratitude to Universiti Teknologi MARA (UiTM) for their support in facilitating this research.

CONFLICT OF INTEREST STATEMENT

The authors agree that this research was conducted in the absence of any self-benefits, commercial or financial conflicts and declare the absence of conflicting interests with the funders.

AUTHORS' CONTRIBUTIONS

All authors participated in conducting the research, drafting and revising the article, conceptualising the central research idea, providing the conceptual framework, and reviewing and approving the article for submission.

REFERENCES

Ahmad, R., Arsad, S., Said, R., Hassan, A., & Shahabuddin, S. (2020). Development of Framework for Good Governance Index for Mosques in Kedah. *Development, 7*(19), 2020. Retrieved from: ISSN: 2394-5125, https://doi.org/10.31838/jcr.07.19.1041

Al-Najjar, B. & Alsyouf, I. (2003). Selecting the most efficient maintenance approach using fuzzy multiple criteria decision making. *International Journal of Production Economics, 84*(1), 85-100. Retrieved from: https://doi.org/10.1016/S0925-5273(02)00380-8

Amaratunga, D. & Baldry, D. (2002). Moving from performance measurement to performance management. *Facilities, 20*(5/6), 217-223. Retrieved from: https://doi.org//10.1108/02632770210426701

British Standard 3811 (1993). British Standard Guide to Building Maintenance Management. Glossary of terms used in terotechnology, BS 3811:1993 C.F.R. https://doi.org/10.3403/00319632

Brown, M. G., Hitchcock, D. E. & Willard, M. L. (1994). *Why TQM Fails and What to Do About It. Burr Ridge, IL*: Irwin Professional Publishers. Castro, E.(1999). PERL and CGI for the World. Retrieved from: https://doi.org/10.4236/jss.2016.411017

Cholasuke, C., Bhardwa, R. & Antony, J. (2004). The status of maintenance management in UK manufacturing organisations: results from a pilot survey. *Journal of Quality in Maintenance Engineering, 10*(1), 5-15. Retrieved from: https://doi.org/10.1108/13552510410526820

Ding, S.-H., & Kamaruddin, S. (2015). Assessment of distance-based multi-attribute group decision-making methods from a maintenance strategy perspective. *Journal of Industrial Engineering*

International, 11(1), 73-85. Retrieved from: https://doi.org/10.1007/s40092-014-0078-2

Hamdan, W. S. Z. W., Hashim, M. H. M. H., Radzuan, N. A. M., Hassin, M. A. & Ismail, R. A. (2023). The Importantce Maintenance Budgeting for the Mosques Management in Malaysia: A Systematic Literature Review. *Journal of Tourism, Hospitality and Environment Management, 8*(34), 78-92. Retrieved from: https://doi.org/10.35631/JTHEM.834006

Hassan, S. N. S., Seh, H., Mohamad, K., & Tawil, S. F. M. (2021). Managing Website Development for Darul Hana Mosque in Sarawak by Implementing ADDIE Approach. *UMRAN-International Journal of Islamic and Civilizational Studies, 8*(1). Retrieved from: https://doi.org/10.11113/umran2021.8n1.457

Johnson, T. M., & Crossing, P. F. (2020). The World by Religion. *Journal of Religion and Demography, 7*(1), 4-91. Retrieved from: https://doi.org/10.1163/2589742x-12347101

Ku, S. & Kim, C. (2019). Development of a model for maintenance performance measurement. *Journal of Quality in Maintenance Engineering, 26*(1), 69-86. Retrieved from https://doi.org/10.1108/jqme-07-2018-0060

Loosemore, M. & Hsin, Y. (2001). Customer-focused benchmarking for facilities management. *Facilities, 19*(13/14), 464-476. Retrieved from: https://doi.org/10.1108/EUM0000000006204

Nilsson, J. & Bertling, L. (2007). Maintenance management of wind power systems using condition monitoring systems—life cycle cost analysis for two case studies. *IEEE Transactions on energy conversion, 22*(1), 223-229. Retrieved from: https://doi.org/10.1109/TEC.2006.889623

Parida, A. & Kumar, U. (2009). Maintenance productivity and performance measurement. In *Handbook of maintenance management and engineering* (pp. 17-41): Springer. Retrieved from: https://doi.org/10.1007/978-1-84882-472-0_2

Rani, N. A. A., Baharum, M. R., Akbar, A. R. N. & Nawawi, A. H. (2015). Perception of Maintenance Management Strategy on Healthcare Facilities. *Procedia - Social and Behavioral Sciences, 170*, 272-281. Retrieved from: https://doi.org/10.1016/j.sbspro.2015.01.037

Ruparathna, R., Hewage, K. & Sadiq, R. (2018). Multi-period maintenance planning for public buildings: A risk based approach for climate conscious operation. *Journal of Cleaner Production, 170*, 1338-1353. https://doi.org/10.1016/j.jclepro.2017.09.178

Sapril, M., Muin, Z. A. & Sipan, I. (2016). Key Drivers of an Effective Facilities Management Practice for Malaysia State Mosque *MATEC Web of Conferences, 66*, 9. Retrieved from: https://doi.org/10.1051/matecconf/20166

Seeley, I. H. (1987). *Building maintenance*: Macmillan International Higher Education. Retrieved from: https://doi.org/10.1007/978-1-349-18925-0

Shoemaker, S. J. (2021). 15 On the Holy Places Adomnán/Arculf. In *A Prophet Has Appeared* (pp. 164-170): University of California Press. Retrieved from: ISBN: 9780520299610

Sofii, I., & Pertiwi, I. (2021). The Role of The Mosque in Economic Empowerment and Community Welfare Through MSMEs in The South Jakarta Region. *JES (Jurnal Ekonomi Syariah), 6*(1), 36-52. Retrieved from: https://doi.org/10.30736/jesa.v6i1.122

Swanson, L. (2001). Linking maintenance strategies to performance. *International Journal of Production Economics. 70*(3), 237-244. Retrieved from: https://doi.org/ 10.1016/s0925-5273(00)00067-0

Tsang, A. H. C., Jardine, A. K. S., & Kolodny, H. (1999). Measuring maintenance performance: a holistic approach. *International Journal of Operations & Production Management, 19*(7), 691-715. https://doi.org/10.1108/01443579910271674

Waeyenbergh, G., & Pintelon, L. (2002). A framework for maintenance concept development. *International Journal of Production Economics, 77*(3), 299-313. https://doi.org/10.1016/s0925-5273(01)00156-6

Wang, L., Chu, J. & Wu, J. (2007). Selection of optimum maintenance strategies based on a fuzzy analytic hierarchy process. *International Journal of Production Economics, 107*(1), 151-163. https://doi.org/10.1016/j.ijpe.2006.08.005