

# MAINTENANCE MANAGEMENT DETERMINANTS APPRAISAL OF HOSPITAL BUILDINGS

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This research examines the maintenance practice of hospital buildings in Malaysia. Recently, the increment of hospital buildings' accidents has affected its performances as a result of determinants. However, the maintenance practice employed in the hospitals has a direct impact on the performance of hospital buildings. The fast-growing population of Malaysia necessitates proactiveness on the part of the government regarding the provision of efficient healthcare and ensuring the wellbeing of the citizenry. In this regard, the state of hospital buildings is inextricably linked to quality healthcare. This study evaluates the determinants that impair the quality of hospital buildings in Malaysia in order to improve their efficiency and preempt the avoidable building pitfalls through effective maintenance management. The survey questionnaire was used in order to achieve the objective of this study to users of hospital buildings, the outcomes sought after concerned building component issues such as finishes, cleanliness, aesthetics, ventilation and other determinants that affected the performance of the hospital buildings. The results showed that specific determinants including lighting, ventilation, fire alarms, fire extinguisher signage, floor conditions, lifts and quality of air depreciate the performance of hospital buildings. In addition, the procurement methods of maintenance work are completely outsourcing in hospitals and combinations of outsourcing and in-source methods in a private hospital. Moreover, the study found that the current methods of maintenance management adopted for hospital buildings remain typically corrective. This has always resulted in deprived user satisfaction, unproductive service delivery, and the prolongation of diverse maintenance problems.

**Keywords:** Determinants performance, Maintenance practices, Service settings, Healthcare organization, Building lifecycle.

## 1 INTRODUCTION

As a developing country, the Malaysian government has been proactively involved in improving the lives of its citizenry especially regarding the efficient provision of adequate healthcare and health service delivery. In this respect, the adoption of effective hospital building maintenance practices indisputably contributes to the improved efficiency of the health sector thereby resulting in improved health outcomes, and more sustainable health service delivery. This is because the appropriate maintenance of buildings constitutes an intrinsic part of the broader design and construction process of buildings (Shabha 2003). Hence, disregarding the maintenance management of the hospital buildings leads to the further deterioration of the hospital buildings; this subsequently decreases the quality of healthcare service delivery and the overall wellbeing of the citizenry. Maintenance management must be prioritized to ensure the optimal performance of hospitals, their amenities, and the excellent delivery of healthcare services (Jandali *et al.* 2018).

Adopting appropriate building maintenance management practices is not only crucial for providing a safe and comfortable environment for people, but it also prolongs the lifespan of buildings and increases sustainability performance (Kutucuoglu *et al.* 2001). When proper maintenance management is adopted and the prerequisite standards are strictly adhered to, a building's lifecycle can be lengthy with the use of modern technology (Tan *et al.* 2014). However, to be successful, maintenance management requires relevant performance information to enable the execution of the relevant maintenance actions (Samat *et al.* 2011). This is particularly important as it remarkably affects the productivity of hospital buildings. For example, according to a recent study conducted on Malaysian hospital designs, insufficient knowledge about the construction of buildings from the architect or designer in the design stage had devastating effects on the maintenance management of hospital buildings (Razak and Jaafar 2012). To ameliorate such issues and prolong the lifespan of hospital buildings, it is crucial to ensure the meticulous selection of suitable materials and finishes, the utilization of specialists with the requisite knowledge about the construction plan beginning from the design stage, and employ the best construction techniques. Although the maintenance management of hospital buildings has been studied extensively in countries such as the US, Australia, Canada, Israel, and the UK, the available research focus on the safety, design, and construction phases of the hospital buildings. Thus, there is a relative paucity of research on the determinants that negatively affect the efficiency, measurement, and implementation of maintenance management of hospitals buildings in Malaysia. This underscores the relevance of studies such as this one to fill the existing gap in knowledge.

## 2 LITERATURE REVIEW

Universally, there has been an upsurge of academic investigation into the determinants that depreciate the quality and productivity of hospital buildings. For instance, a study in South Africa reported the ineffective maintenance management practices in hospitals, and identified the lack of ethical labor management systems, lack of skill training programs and poor spare inventory and purchasing system as the main culprits (Mwanza and Mbohwa 2015). Similarly, in Nigeria, the public maintenance management sector has been dormant due to the unavailability of funds thereby neglecting the indispensable practice of building maintenance management to the detriment of the entire country (Owolabi *et al.* 2014). Widespread dearth of information about the actual erection of buildings during the planning of building maintenance was recorded in Sweden (Lind and Muyingo 2012), whereas, a study conducted in Gaza, Palestine identified humidity and poor workmanship as the primary determinants affecting the best practices of hospital buildings (Enshassi and El Shorafa 2015). In Malaysia, the state of hospital maintenance management is characterized by inadequate quality servicing (Ruslan 2007, Kamaruzzaman and Zawawi 2010, Au-Yong *et al.* 2014). This is attributable to several determinants such as the absence of appropriate design and planning advice based on overall performance, inadequate performance standards, lack of building performance monitoring data, and the lack of knowledge regarding maintenance strategies (Au-Yong *et al.* 2014). Some studies further recognized the unavailability of replacement components, non-responsiveness to maintenance requests, insufficient building maintenance funds, inexistent building maintenance standards and the absence of preventive maintenance protocols as the core determinants affecting building maintenance management in Malaysia (Talib *et al.* 2014). Additionally, an extensive review of the determinants affecting the management of the maintenance department of hospital buildings highlighted a continuum of issues ranging from poor administration of maintenance management groups to the lack of communication between the relevant stakeholders (Jandali *et*

*al.* 2018) [See Table 1 below]. Due to the prevalence of these issues, several hospital buildings in the country were found to not only exist below the required standards in terms of functionality and usage, but they were also in unproductive and deplorable states.

Table 1. Determinants pertaining to the management of the maintenance department in the hospital buildings (Jandali *et al.* 2018).

1	Poor administration of maintenance management groups
2	Lack of documentation of maintenance work
3	Shortage of professionally trained maintenance personnel
4	Inefficient inventory systems
5	Inadequate training and development of personnel
6	Lack of skilled workforce to conduct maintenance works in hospitals previously designed and constructed by expatriates
7	Frequent shortages of materials and spare parts due to the absence of efficient inventory systems
8	Nonexistence of long-term arrangements for the supply of essential replacements parts
9	Lack of successful maintenance programs by the maintenance departments
10	Absence of systematic maintenance programs

These issues are compounded by the fact that current approaches to maintenance management in hospital buildings are not only cost-driven, expensive, corrective, and fragmented, but the procurement of maintenance services are also mostly outsourcings (Olanrewaju *et al.* 2018, Salleh *et al.* 2020). This necessitates the urgent reevaluation of the decision-making procedures of hospital maintenance organizations especially because the efficacy of maintenance results is contingent on the completeness and correctness of the identified determinants. In similar vein, maintaining the optimal performance of hospital buildings is pertinent because their sustained productivity depends on the efficiency of building maintenance management (Olanrewaju *et al.* 2018, Salleh *et al.* 2020). Therefore, it is important for both the users of buildings and maintenance organizations to take cognizance of these prevailing determinants. This assertion is reiterated by earlier studies, which attributed the increase in the shorter maintenance spans, exorbitant maintenance costs, higher complaints, and loss of profits to the dearth of comprehensive research, poor investigation findings, and existing references on the subject of hospital building maintenance (Olanrewaju *et al.* 2019). Furthermore, the prevailing approaches to maintenance management of hospital buildings in Malaysia have been mostly corrective and preventive thus, resulting in issues such as low users' satisfaction, high costs of maintenance, and extremely poor performance of buildings (Olanrewaju *et al.* 2019, Salleh *et al.* 2020). Since preventive maintenance plans are condition-based, they are neither executed based on user value systems nor to enhance the buildings' performance (Olanrewaju *et al.* 2019). Unfortunately, the present preventive-based maintenance management practices are exorbitant, thereby aggravating maintenance users' displeasure.

### 3 RESEARCH METHODOLOGY

This study utilized structured questionnaires to gather primary data because of the reliability of the aim and objectives of this study. A structured questionnaire is also known as a standardized question. Since it encourages standardization, the structured questionnaire curtails errors due to difference in the questions (Sekaran and Bougie 2016, Cohen *et al.* 2017). The data was analyzed using the Statistical Package of Social Science 25 (SPSS). The respondents were users of hospital buildings who were required to rank parameters according to the determinants affecting their specific buildings. The respondents comprised health care providers such as physicians, psychologists, dentists, veterinarians, medical doctors, medical officers, and nurses, and also

maintenance management professionals including civil engineers, mechanical engineers, and builders. The respondents willingly agreed to participate in the research. The survey used a “level of importance” with five-points whereby 1= Very Comfortable, 2=Uncomfortable, 3= Acceptable, 4=Comfortable, and 5=Very comfortable. 80% of the questionnaires circulated for the survey were retrieved and valid, 5% were invalid, while 15 % had no response. They were accordingly analyzed by ranking and shown in Table 2.

Table 2. Determinants affecting the maintenance management of hospital buildings results.

Hospital Buildings Components	Ranking
Lighting bulbs	1
Ventilation	2
Floors (Floor Tile/Floor Finishes)	3
Fire Alarms	4
Fire Extinguisher signage	5

#### 4 DISCUSSION

The foregoing table illustrates the five highest ranking determinants affecting the maintenance management of hospital buildings as garnered from the results of the respondents. Although the rankings varied among the different buildings, issues such as lighting, ventilation, Floor (Floor Tile/Floor Finishes, Fire Alarm and Fire Extinguisher Signage ranked extremely high whereas floor condition, lifts and quality of indoor air were ranked seventh and eighth respectively, in all the buildings. It is noteworthy that lighting bulbs was ranked remarkably high by respondents. These findings reinforce the urgency of improving the maintenance management of hospital buildings in Malaysia. More importantly, since the users of the building are major stakeholders who are accurately informed about the efficiency of the buildings their insights would prove invaluable in the maintenance management process. This is particularly vital because if both building users and the maintenance department identify the determinants and necessary services required, then it would be easier to prioritize them when planning maintenance.

From the result and due to space constraint, five highest ranking determinants affecting the maintenance of hospital buildings is listed and discussed, while others is explained as well, it is apparently clear that the maintenance of the buildings could certainly be improved if the maintenance department and others involved are able to identify the breaches within what the users need and the service they receive, by taking this into deliberation whenever they wanted to introduce maintenance according to (Olanrewaju *et al.* 2011). Olanrewaju *et al.* (2010) asserted that the building users must be involved in the maintenance management system of the building so as to safeguard and their satisfaction is guarantee by involving in the activities as likewise. For all the determinants affecting the maintenance management of the buildings; the limits of hospital buildings efficiencies are imperative from the results specified. Though, the cost of all essential maintenance responsibilities for the actual year, is possible to surpass the budget. Surely, the maintenance department do not only confront with logistics restraints nevertheless, but there was also continuous decrease of the maintenance allocation. Maintenance department has the major stakeholders to ensure that all the hospital buildings and its components are in good condition and do fit in at all times. There should be a proper and workable maintenance policy, which is efficient, effective and viable to the hospital buildings management. This maintenance policy will determine the kind of maintenance strategies to be employed on the hospital buildings and how the type of organizational structure will look like so as to be proactive. From survey conducted, it was discovered that some hospital buildings do not has maintenance policy, as many of the users especially workers in the hospital do not know that there is a policy as such. To fully

optimize user satisfaction therefore, building users must be involved in the maintenance management systems of buildings (Salleh *et al.* 2020). Arguably, the insights of building users should ideally inform the maintenance process (Idrus *et al.* 2009). Effective hospital building maintenance would significantly maximize profits for hospitals, ensure user satisfaction and the productivity of the buildings. Therefore, it is pertinent to devise strategies would enhance the existing maintenance management practices towards measuring, monitoring, and ultimately accelerating the overall maintenance performance of hospital buildings in Malaysia.

## 5 CONCLUSION

The crux of the argument herein has been that the efficacy of hospital building maintenance management systems are affected by numerous determinants and constraints that significantly influence the performance of the building throughout its lifespan. The predominant maintenance determinants identified include structural safety issues such as the walls and floors, the overall safety condition of the buildings, inadequate lighting, ventilation and the inaccessibility of maintenance application in the occupied buildings. Considering the crucial role hospital building maintenance management plays in the process of quality healthcare delivery and user satisfaction it must be prioritized. A maintenance management that focuses exclusively on physical inspection cannot deliver long-term value to all the stakeholders and will inadvertently perpetuate poor service delivery. Therefore, this study recommends a more holistic and value-based approach to the maintenance management of hospital buildings in Malaysia.

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