

**THE ASSESSMENT OF BUILDING DEFECTS MAINTENANCE  
IN HOSPITAL BUILDING**

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**A thesis submitted in fulfillment of the  
requirements for the award of the degree of  
Bachelor of Civil Engineering**

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**NOVEMBER 2010**

## **ABSTRACT**

Malaysia is one of the development countries that rapidly growing in all sectors including construction sector. Hospital is one of the government sectors in Malaysia that has many assets, needs maintenance to prevent the assets from deterioration. There are two maintenance systems that presently applied at hospital which is preventive maintenance and corrective maintenance. Building defects arise through inappropriate or poor design, specification and construction as well as to insufficient attention given to building maintenance. The tropical climates condition, such as in Malaysia, the also one problem that can affect significantly to the building defects. Under normal condition all building begins to deteriorate the moment after they are constructed, and of course maintenance is needed. Regard to the highly cost of maintenance it is important to study maintenance problem so that an effective maintenance can be carried out. To achieve the aim of this study, three (3) objectives have been set which is to determine type of defects occurred in hospital, to determine the effectiveness of maintenance system management in hospital and to compare the management maintenance system between private and public hospital. To obtain the data the following knowledge acquisition methods were used by interview and questionnaire. Result of the study showed the responds of the end user customer for the overall building conditions.

## ABSTRAK

Malaysia merupakan salah satu negara membangun yang berkembang pesat dari segi semua sektor termasuklah sektor pembinaan. Hospital merupakan salah satu sektor kerajaan di Malaysia yang mempunyai banyak asset serta memerlukan penyelenggaraan untuk mengelakkan aset daripada berlaku kerosakan. Terdapat dua system penyelenggaraan yang diamalkan disetiap hospital iaitu penyelenggaraan pencegahan dan penyelenggaraan pembetulan. Kecacatan pada bangunan berlaku akibat daripada reka bentuk yang tidak sesuai dan juga dari segi spesifikasi dan pembinaan yang tidak sempurna serta kurangnya perhatian kepada penyelenggaraan bangunan. Keadaan iklim hutan hujan tropika seperti di Malaysia juga merupakan salah satu masalah yang boleh mengakibatkan kecacatan pada bangunan. Pada kebiasaannya, setiap bangunan akan mengalami kerosakan. Maka, penyelenggaraan bangunan perlu dilakukan. Penyelenggaraan perlu dilakukan dengan segera apabila sebaik sahaja berlaku kerosakan untuk mengelakkan kos yang tinggi untuk membaiki kerosakan tersebut. Untuk mencapai sasaran kajian ini, tiga (3) objektif utama telah dikenal pasti iaitu untuk menentukan jenis kerosakan yang berlaku di hospital, untuk menentukan keberkesanan sistem pengurusan penyelenggaraan di hospital dan juga membandingkan sistem pengurusan penyelenggaraan antara hospital swasta dan hospital awam. Untuk mendapatkan data, beberapa kaedah telah digunakan menerusi mewawancara pihak yang terlibat dan mengedarkan soalan kajiselidik. Hasil keputusan kajian menunjukkan respon pengguna fasiliti untuk keseluruhan keadaan bangunan.

## ABSTRAK

Malaysia merupakan salah satu negara membangun yang berkembang pesat dari segi semua sektor termasuklah sektor pembinaan. Hospital merupakan salah satu sektor kerajaan di Malaysia yang mempunyai banyak asset serta memerlukan penyelenggaraan untuk mengelakkan aset daripada berlaku kerosakan. Terdapat dua system penyelenggaraan yang diamalkan disetiap hospital iaitu penyelenggaraan pencegahan dan penyelenggaraan pembetulan. Kecacatan pada bangunan berlaku akibat daripada reka bentuk yang tidak sesuai dan juga dari segi spesifikasi dan pembinaan yang tidak sempurna serta kurangnya perhatian kepada penyelenggaraan bangunan. Keadaan iklim hutan hujan tropika seperti di Malaysia juga merupakan salah satu masalah yang boleh mengakibatkan kecacatan pada bangunan. Pada kebiasaannya, setiap bangunan akan mengalami kerosakan. Maka, penyelenggaraan bangunan perlu dilakukan. Penyelenggaraan perlu dilakukan dengan segera apabila sebaik sahaja berlaku kerosakan untuk mengelakkan kos yang tinggi untuk membaiki kerosakan tersebut. Untuk mencapai sasaran kajian ini, tiga (3) objektif utama telah dikenal pasti iaitu untuk menentukan jenis kerosakan yang berlaku di hospital, untuk menentukan keberkesanan sistem pengurusan penyelenggaraan di hospital dan juga membandingkan sistem pengurusan penyelenggaraan antara hospital swasta dan hospital awam. Untuk mendapatkan data, beberapa kaedah telah digunakan menerusi mewawancara pihak yang terlibat dan mengedarkan soalan kajiselidik. Hasil keputusan kajian menunjukkan respon pengguna fasiliti untuk keseluruhan keadaan bangunan.

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## **CHAPTER 1**

### **INTRODUCTION**

#### **1.0 Title of the project**

The assessment of building defects maintenance in hospital building.

#### **1.2 Introduction**

Malaysia is one of the development countries that rapidly growing in all sectors including construction sector. There are many large and complex projects that have been built according to the demands of public and private sectors. To fulfill the demands of both sectors, there are many expected error and defects that will occur during the construction and that will be results in high cost of maintenance.

Building services and maintenance is a combination of several actions in which to retain or restore an item to perform its required action. Hospital is one of the government sectors in Malaysia that has many assets, needs maintenance to prevent the assets from deterioration. There are two maintenance systems that presently applied at hospital which is preventive maintenance and corrective maintenance. [1]

Increase of maintenance cost can be attributed to faulty designs. Many of these maintenance problems arise where design is satisfactory in principle but has a low probability of achievement in practice. These are not to be regarded as defects in workmanship but rather as too high an expectation in design. For example, the detail for the placing of the reinforcement in cladding panels may appear to provide the necessary cover on an engineer's drawing but would need a 'watch-making technique' to achieve this which would be quite impractical on a building site or even in factory prefabrication.

The correct identification of types of building material for maintenance purposes, as to be cleaned, refinished, renovated, or restored is the most important first step in the process of identifying the building defect. A thorough investigation should be carried out before any repair work is undertaken. Therefore, the technical requirement of investigating and diagnosing faults to assess condition, the organizational needs to specify, select, implement, and supervise, and corrective program are needed to be handled properly. There is no doubt that improved quality increases costs in labor and supervisor. However, this careful construction of structures attracts a proportionate consequence in necessary maintenance and repair cost during the life of a building. [30]

A thorough inspection and supervision should be carried out in building works to ensure that construction was done according to approved structure plan. However, there are many cases of building defect due to the careless construction work. In Singapore, it is found by building and construction authority (BCA) that about ten complaints are made in a month about property defects recently. Leaky roofs and walls, chipped and cracked tiles, wall cracks, bad plumbing, and electrical problems are the most common problem of building defect. Due to very poor work or bad quality of the building material, most of defects may show up in building as soon as they are completed and handed over to the building owner instead of after a period of use. [30]

Poor maintenance may result in structural failure and money wastage. It is obvious that the maintenance is very important and needed for all sectors including properties sectors. Regard to the highly cost of maintenance it is important to study maintenance problem so that an effective maintenance can be carried out.

Building defects arise through inappropriate or poor design, specification and construction as well as to insufficient attention given to building maintenance. The tropical climates condition such as in Malaysia, also one problem that can affect significantly to the building defects.[2]



The correct identification of types of building material for maintenance purposes as to be cleaned, refinished, renovated or restored is the important step in the process of identifying building defect. An investigation should be carried out before any repair work is undertaken. The organizational needs to specify and supervise the technical requirement of investigating and diagnosing faults to assess condition. There is no doubt that improved quality increases costs in labor and supervisor. However, this careful construction of structures attracts a proportionate consequence in necessary maintenance and repair cost during the life of a building.[2]

The levels of cleanliness vary major in hospitals. The cleanliness of any hospital environment is important for infection control and patient well being. Cleaning staff play an important role in quality improvement, publics confident to hospitals and in reducing infection and related risks. Cleanliness is the absence of dirt, including dust, stain, bad smell and garbage. If we state that a hospital is clean, we assume that it looks clean and that it is safe for patients. Unfortunately there are microbes that invisible to the naked eye. Purposes of cleanliness include health, beauty, absence of offensive odor and to avoid the spreading of dirt and contaminants to oneself and others. [3]

### **1.3 Problem Statement**

According to Derek Miles et al (1986), there are three main problems in maintenance which is inadequate financial, bad management, and poor building design.

The first problem is financial management. To fulfill the demands of private and public sectors, there are many expected error and defects that will occur during the construction and that will be results in high cost of maintenance.

The second problem is bad management. Organizations need effective managers and employees to maintain smooth management. Organizations cannot succeed without their personnel efforts and commitment. Job satisfaction is critical to retaining and attracting well-qualified personnel. This is especially an issue in medical institutions such as hospitals where specialist training and retention are highly important.

The third problem is poor building design. It is important when decide the material that will be use in construction. The differences in capacity and facility would triggered a different maintenance treatment requires the study to identify whether the present maintenance system is can be implemented to the all buildings.

Most hospitals have their own domestic specifications for wards, operating theatres, outpatient and non-clinical areas. More countries are producing national standards for environmental cleaning. These set a necessary and valuable precedent but they are not based on sufficient scientific evidence to justify their contents. [5]

#### **1.4 Objectives**

1. To determine type of defects occurred in hospital.
2. To determine the effectiveness of maintenance management system in hospital.
3. To compare the management maintenance system between private and public hospital.

#### **1.5 Scope of works**

1. Seeking the guidelines of building defects of hospitals.
2. To seamed level of effectiveness of the system.
3. Questionnaires will be distributing to technical people in several hospitals that involved in maintenance of hospital.

## **CHAPTER 2**

### **LITERATURE REVIEW**

#### **2.1 Organization**

Organizations are social systems where human resources are the most important factors for effectiveness and efficiency. Organizations need effective managers and employees to achieve their objectives. Organizations cannot succeed without their personnel efforts and commitment. Job satisfaction is critical to retaining and attracting well-qualified personnel. This is especially an issue in medical institutions such as hospitals where specialist training and retention are highly important. [7]

## **2.2 Hospital**

Hospital is a building in which the sick, injured, or infirm are received and given treatment. Public or private institution founded for reception and cure, or for the refuge, of persons diseased in body or mind, or disabled, infirm, or dependent, and in which they are treated either at their own expense, or more often by charity in whole or in part. [16]

It is an institution that provides medical, surgical, or psychiatric testing and treatment for people who are ill, injured, and pregnant, etc. on an inpatient, outpatient, or emergency care basis. It is often involved with public health programs, research, and medical education.

Hospitals may be public (government owned) or private (profit making or not profit) in most nations except the U.S. that most are public. They may also be general, accepting all types of medical or surgical cases, or special (children's hospitals and mental hospitals) and limiting service to a single type of patient or illness. However, general hospitals usually also have specialized departments, and special hospitals tend to become affiliated with general hospitals. [17]

## **2.3 Hospital Management**

Whether operating a small clinic or a large hospital, successful medical facility management depends on how well healthcare managers deal with operational challenges such as staffing, employee relations, quality outcomes, competitive advantages and facilities management. Today's healthcare managers must be armed with a diverse skill set to handle complicated issues facing healthcare facilities in order to achieve lower operating costs, improved service quality, greater efficiency and better access to healthcare. [8]

## **2.4 Maintenance**

### **2.4.1 Poor maintenance**

The general appearance of wards and public areas varied between hospitals but was not always related to the level of cleanliness. Some areas appeared clean but on inspection did not meet the acceptable level. Other areas appeared poor because of shabby decoration and poor fabric but were found to achieve acceptable levels of cleanliness. In some hospitals it was observed that the poor state of repair of the building and equipment makes it difficult to maintain levels of cleanliness. Some areas, such as psychiatric and learning disabilities wards, looked untidy due to behavioral difficulties of particular patient groups but were felt to achieve acceptable levels of cleanliness. The appearance of wards is not always in line with the findings against specific criteria for levels of cleanliness. Poor maintenance of buildings and fabric, the

need for redecoration and dirty windows all contribute to the public perception that levels of cleanliness are poor. [9]

#### **2.4.2 Preventive Maintenance**

Preventive maintenance is a schedule of planned maintenance actions aimed at the prevention of breakdowns and failures. The primary goal of preventive maintenance is to prevent the failure of equipment before it actually occurs. It is designed to preserve and enhance equipment reliability by replacing worn components before they actually fail. Preventive maintenance activities include equipment checks, partial or complete overhauls at specified periods, oil changes, lubrication and so on. In addition, workers can record equipment deterioration so they know to replace or repair worn parts before they cause system failure. Recent technological advances in tools for inspection and diagnosis have enabled even more accurate and effective equipment maintenance. The ideal preventive maintenance program would prevent all equipment failure before it occurs. [10]

### **2.4.3 Corrective maintenance**

Corrective maintenance can be defined as the maintenance which is required when an item has failed or worn out, to bring it back to working order. Corrective maintenance is the most commonly used maintenance approach, but it is easy to see its limitations. When equipment fails, it often leads to downtime in production, and sometime it causes spreading of damage to other parts. In most cases this is costly business. Also, if the equipment needs to be replaced, the cost of replacing it alone can be substantial. Reliability of systems maintained by this type of maintenance is not known and can not be measured. Therefore, corrective maintenance is carried out on all items where the consequences of failure or wearing out are not significant (less important items) and the cost of this maintenance is not greater than preventive maintenance.[11]

### **2.4.4 The variability of demand for maintenance**

From day to day, there are jobs that reported to the maintenance department either by internal post or telephone call. The jobs were categories by maintenance department as emergency, urgent and un-urgent jobs. An emergency job is a job that need be done immediately because of the cost and safety reasons, while urgent job is a job that needs to be done in 48 hours and un-urgent job is a job that can be delayed for more than one month without affecting cost or safety. Emergency jobs that reported during working hours must be done as soon as possible and when its reported during night time, weekends, holidays or outside of working hours are dealt with by a duty