ISSUES IN RAILWAY STATION BUILDING MAINTENANCE IN MALAYSIA (KTMB)

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A project report submitted in partial fulfillment of the requirements for the award of Bachelor of Science (Hons) Construction Management

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DECLARATION

I hereby declare that this project report is based on my original work except for citations and quotations which have been duly acknowledged. I also declare that it has not been previously and concurrently submitted for any other degree or award at UTAR or other institutions.

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APPROVAL FOR SUBMISSION

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Specially dedicated to
my beloved parents. Without their support, understanding,
and most of all love, the completion of this work
would not have been possible.

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ISSUES IN RAILWAY STATION BUILDING MAINTENANCE IN MALAYSIA (KTMB)

ABSTRACT

A case study research was conducted in Department of facility management at Ipoh KTMB stations. The Facility Management Department is maintaining 11 railway stations from Behrang to Padang Rengas. The main objective of this research is to identify and analyze the issues that the facility manager faces in the maintenance of KTMB stations. Facilitating KTMB stations have been changeling task for the facility manager due to an unrealistic method of budget allocations and lack of manpower which leads to poor performance of maintenance work in the stations.

Budget constraint is one of the important issues that the facility management is facing. The current budget allocation is based on the previous maintenance cost and currently there is no contingency budget for maintenance tasks that fall outside the scope of the budget. Lack of budget in maintenance activity causes a delay of certain repair works up to 11 months, and it reduces the standard of the maintenance work at the KTMB stations.

An insufficient number of manpower for maintaining 11 stations causes the maintenance department to sacrifice the quality of the work to attend to as many as possible maintenance works without creating a delay. Carrying out most of the maintenance activities based on corrective maintenance create lots of visible defects in most of the stations. Due to the lack of a standard for building maintenance, defects will be visible until the component no longer can function. Inability to practice routine maintenance to keep the building in good conditions has made the Malaysia's railway stations with an unappealing look to the public travelers.

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INTRODUCTION

1.1 General

Malaysia is one of the 13th countries in the world with the upper-middle income economy. Vision 2020 was introduced during the tabling of sixth Malaysia plan in 1991 by former Prime Minister of Malaysia, Mahathir bin Mohamad. The concept encouraged all Malaysian to achieve a self-sufficient industrialized nation by the year of 2020, to take place all aspects of life, from economic prosperity, social well-being, educational, political stability, as well as psychological balance.

Buildings and Infrastructures are the country's most valuable resources. They provide shelters and places for people to work, live and to have some entertainment. Buildings are used to protect and maintain privacy, and also, they are serving as a source of income. So for Malaysia to achieve its vision they must be able to improve their infrastructure and buildings by protecting their heritage building and keeping the existing buildings well maintained. There is no building that does not entirely require any maintenance; every structure from the day that it is planned to be built must undergo certain standard to keep the building that is being built maintainable in future.

As Malaysia is one of the fast developing countries in the southeast region, their attempt at growing its economic and wealth within that past few year was astonishing. By the year 2010, Malaysia was introduced with one of its biggest

transport structure called MRT which was proposed and announced in June 2010 and was approved by the government of Malaysia in December 2010, and the MRT project was commenced on July 2011. However, this was not the only move by Malaysia to achieve their objectives in their vision 2020. Malaysia has 45 railways stations across the country which is under the company of KTM Berhad. Most of these stations had been reconstructed due to the poor condition and performances of the old stations, and it was not efficient to maintain and renovate the stations, and it was the best solution to reconstruct the whole new station, next to the old one.

1.2 Problem Statement

In the recent year, the cost of maintenance in Malaysia has been significantly increased, and this could be due to wrong doing of some maintenance practices. Routine maintenance is usually encouraged, but this does not mean that it is the right way of practice. There are many other aspects that need to be considered while doing the routine maintenance which will be covered up in further chapters.

If individual travel within Malaysia using intercity railway stations, they can at least notice some parts in the stations that require certain maintenance attentions such as defective building materials and unpleasant environment. Although these maintenance tasks might be basic, there are still some stations that are not well maintained, and they do not look appealing to the travelers.

The speed of respond in the maintenance of Malaysia's railway stations are not fast and the maintenance department to solve the maintenance issue are not quickly responsive. Based on the observations that were done by the researcher, some of the maintenance of the stations in Kampar took more than six months to be fixed. Although the issue was visible to the public and would affect the condition of the building, it was still a long time before it was fixed. An interview was done with the maintenance manager of the railways stations to identify the root causes of these delays and issues in the maintenance procedure of railway stations.

Based on the interview with Mr. Rohizam Bin Othman facility manager of the 11 stations on 14th August 2015, there are always issue within these maintenance procedures. If the maintenance problem that is reported by the station master is not within their budget, they have to send a new budget request to the headquarter, and the process and duration to receive the fund, depending on the amount of fund may vary starting from 1 month up to 11 months. Another issue that the maintenance Manager faces is a lack of manpower and in-house maintenance staff which will cause delays in the Maintenance of other stations. For instance, there are 11 stations and only two maintenance team available, when there are more requests for Maintenance than the available maintenance team, Delay would accrue.

1.3 Aim and Objective

Certainly there are issues and problems that we can see in building maintenance of railway stations. Some of these issues might not be seen by the eyes of the passenger who is just traveling to his/her hometown for a weekend trip. But the fact is that the well-maintained station can be the best image for the countries tourist attraction that can not be denied. However, keeping the stations well maintained is not just about keeping it clean or conducting regular maintenance and inspection of work, it's about organizing and scheduling of tasks such as budget allocation, maintenance practices, and respond speed to maintenance work that the facility manager must handle every day.

The aim of this research is to identify and analyze the issues that the maintenance manager faces during the management of the railway stations.

The Main Objectives of This Research Are:

- To investigate the maintenance practices in railway stations.
- To investigate the method of budget allocation in maintenance of the railway stations

To achieve the objectives of this research, an in-depth interview had been conducted with the acting technician of facility management department at Ipoh station. The aim of the interview was to identify the method of budget allocation and maintenance practices for the railway stations. periodic observation to several stations had been conducted to identify and observe building defects and the current maintenance practices by the facility management department.

1.4 Research Outline

This research is consisting of five chapters. Refer to figure 1.1 for the outline flow of the research.

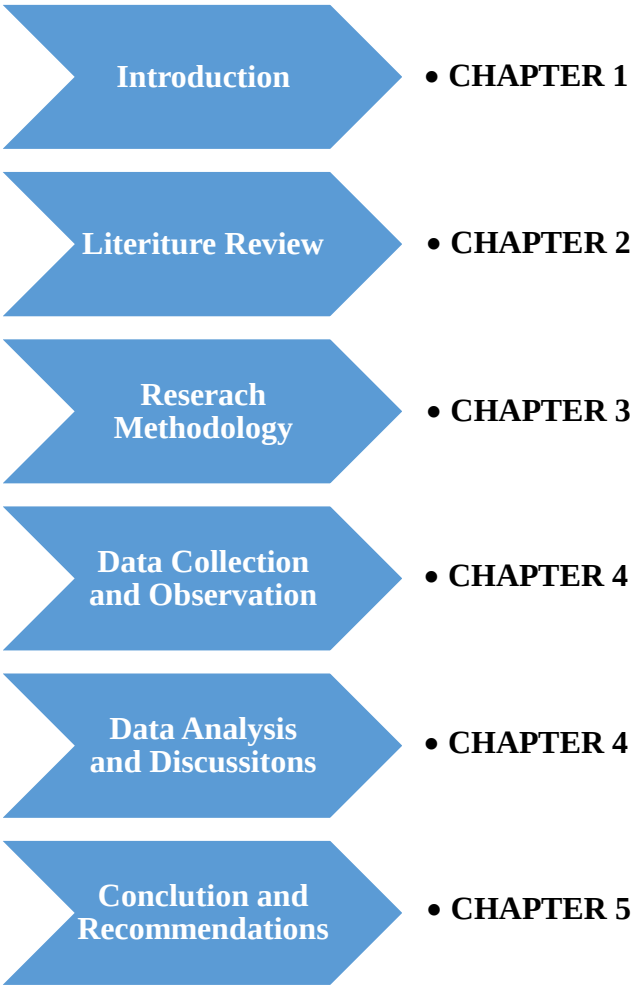


Figure 1.1 – Research Outline

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

In this chapter brief explanation about Malaysia's transportation and different types of train stations that are available and the basic function of building and how building required maintenance is discussed. Different types of building would require various kinds of maintenance. Most of the time maintenance done is not based on the need for the maintenance activity; rather it relies on the budget that was allocated for the maintenance work.

Budget allocation for maintenance is one of the most important factors to consider during the management of the maintenance in a building. In this chapter types of budget allocation and its related function of each will be discussed.

There are many types of maintenance practices that can be used which in this research, the types of practices that are used in Malaysia's railway stations will be identified and the advantages and disadvantages that each practice could have will be analyzed and discussed. Not all the practices are suitable for railway stations and doing good maintenance routine also, could have limitations in the allocation of the budget. Since Government of Malaysia owns the highest percentage of all the railways stations, the budget that the maintenance manager receives is from the government funding and there could be delays and complications that might arise from types of maintenance and their cost pattern.

Based on the interview that was done with the maintenance manager of 11 railways stations, there are no actual standard and policies regarding building maintenance of the railway stations. It means that there is no rule for what to maintain and how it should be maintained. The maintenance practices that are done by the maintenance managers are based on actual experience gained throughout the entire process of maintaining the stations and also from recommendations and experiences of previous facility managers.

2.2 Building Categories

Buildings can be categorized according to their functions, purpose, and types of services they provide for people. Based on De-Chiara and Chrosibie (2001) buildings can be classified as below:

1. Commercial Buildings
2. Hospitality buildings
3. Educational buildings
4. Residential buildings
5. Healthcare buildings
6. Cultural and entertainment buildings
7. Government and public buildings
8. Religious building
9. Transportations buildings

These are types of buildings, and they are categorized based on their functions and the services they provide. Building maintenance requirement and speed of response to maintenance for each of these building could be different. Railway stations will fall under transportation buildings, however in Malaysia, all the train stations are run by the Malaysians government of Malaysia under KTM Berhad.

2.2.1 Transportation Buildings

There are many different types of transportation, and each of them will require unique building structure design and a certain need for maintenance. The need of building maintenance in each structure will be different from other buildings, and this need is based on the function of the building. Transport was started to develop during British colonial rule. Malaysia's road is covering 144,403 km, including 1,821 km of expressways. There are over 39 airports with paved runway and total of 75 airports with the unpaved runway. There is a total of 144,403 km excluding local roads which 116,169 km of those roads is paved. Malaysia was on number 33 comparing to other countries in the year 2010. (Central Intelligence Agency (US), 2010). Based on the year of 2010 Malaysia has a total of 1849 km of railways which 207 km of them are electrified. Malaysia was at number 75 in comparison of railways with other countries on that year.

2.3 Building Facilities

All buildings have certain purposes; some are to accommodate the user, and some are served as temporary stops for people. This will apply for train stations as train stations are temporary stops for passengers who are traveling within the country or even when they are traveling back to their home. In Malaysia, the West part of the country is connected with 45 railways stations. There is certain train which will travel from Kuala Lumpur International Airport (KLIA) to Kuala Lumpur Central. So these temporary stops at these train station will have a great impact on their first impression of new tourists who are visiting Malaysia for the first time. Building maintenance is not just about maintaining the image of the building; rather it's about how these buildings are maintained in a way that it's more efficient for the maintenance managers to be able to manage the maintenance works, efficiently and effectively.

Every building will be judged by its conditions or by its performance. Building performance is qualitative, and it can be measured, but conditions cannot be measured. (Olanrewaju & Abdul-Aziz, 2015). The condition of the building is quantitative it can be measured, touched and it can be seen. However, the performance cannot be touched or seen, but it can be felt by senses. (Olanrewaju & Abdul-Aziz, 2015). In outbound train stations where connect the cities together, stations are mostly maintained based on the performance of the building. However, the right building maintenance practices must focus both on condition and performance of the building. Buildings must be maintenance both on their condition and their performance. If conditions of the floor are not good, and it is damaged, yet the building is serving its performance, there is still need for the maintenance manager to take into consideration regarding maintaining the floor. However, there are factors such as government policies and budget allocation fort each station that will limit the maintenance department in practicing the proper building maintenance.

2.3.1 Functions of Buildings

Buildings and Infrastructures are the country's most valuable resources. They provide shelters for people and places for people to work, live or to have fun. Buildings are used to protect and maintain privacy, and also, they are serving as a source of income. (Olanrewaju & Abdul-Aziz, 2015). Every building has its functions, some of these functions are a core function of every building such as shelter, and some other functions are those that makes and classify the types of building. Not every building is design to have all in one functions and not all types of maintenance could be applied to every building. However, every building will somehow at its life cycle start to deteriorate and decay so they will require maintenance. These maintenance tasks should be done to keep the value of the building as close as possible to the first day that it was build and also to make sure that building is serving its functions as it was designed.

Maintenance in Malaysia’s railway stations is not the same as maintaining a regular residential building. People do not spend much time in the train station as

they do in their home, so the impact of the well-maintained stations might not be as same as how people expect their homes to be. Anyhow, this does not mean that the railways stations do not require any maintenance, but this could be one of the factors that railways stations are not properly maintained. All of the KTMB stations are under the government of Malaysia so to do any types of maintenance they would require funding from government sectors.

2.3.2 Train Stations Buildings

The first railway station that was running in Malaysia was between Malaya (British Malaysia) and Taiping and port weld which was built on 1st June 1885 and the following year 1886 the track between Kuala Lumpur, and Klang was launched (Arkib Negara Malaysia, 1998). Malaysia has four (4) types of trains that each of them has different buildings structures. First, is heavy rail which consists of the KTMB stations across the country which connects most of the cities together with 45 train stations. The second is Light Rapid Transit (LRT) which is located in Klang Valley. The third is monorail stations which are located in Kuala Lumpur city center. The heavy rails are mostly used for intercity passenger transportation and transportation of goods to others cities where LRT is solely for passenger transportation within Klang Valley.

2.4 Malaysia's Railway Stations

There are 45 KTMB stations that connect most of the cities from north to south in Peninsular Malaysia (West Malaysia). (KTM Berhad, 2013). Two of these railway stations that are located in Kuala Lumpur Station and Ipoh station are heritage buildings. There are many people in Malaysia using KTMB to travel from where they work or study to back to their hometown. There is an electric train from Ipoh station to Kuala Lumpur Central, which will take approximately two hours to travel. The service was launched in June 2010, and it was extended from Ipoh to Padang

Besar on 10 July 2015. ETS trains from Ipoh to Padang Besar has 24 stops at stations and at the moment, since the service was newly introduced, only one train for both direction is working. According to KTMB, there will be more trains in service when more stock becomes available. ETS trains will travel up to 140 km/h on an electrified line, and it has a capacity of carrying 340 passengers. (Tmrin & Amar, 2015)

Every KTMB stations have their own car park, and they provide basic facilities needed for the passengers such as praying room, toilet, and a mini mart. Every station has a VIP room that based on the interview with Kampar stations Master; those rooms are used for VIP passenger who has to wait for their pickup transport. VIP passengers are including government agency's individual or any royalty family. However, the content of the room was not available for a visit. Other facilities are ticketing room and operation room. Operation room is where all the trains are scheduled, and the operator has contact with every train driver.

2.4.1 Conditions and Performance of Railway Stations

Every train station has one station master who is in charge of the train stations. The statins master is responsible for all the communication with train drivers and all the trains rescheduling if there is any delay.

Most of the KTMB stations had been reconstructed due the performance and conditions of the old stations. In most of the locations such as Kampar, Tapah Road, Batu Gajah the new stations had been built next to the old station and the old stations are still visible to public.

2.4.2 Maintenance Procedure in Malaysia's Railway Stations

When any maintenance issue rises in the station, the station master will send a request to facility manager in Ipoh station and if the maintenance issue is within the

budget and within their routine maintenance they will send a request to the nearest maintenance department. There are 11 stations in northbound stations from Behrang to Padang Rengas and within these 11 stations, there are two stations which have in-house maintenance Department. Locations of these departments are strategically placed so that it can reduce the time of travel to other stations. Once the Maintenance department receives the request, they have standby team, and they will deploy the team to attend to the maintenance issue. This is an ideal case that could happen in the maintenance process of these railway stations.

Based on the interview with Mr. Rohizam Bin Othman facility manager of the 11 stations on 14th August 2015, there are always issue within these maintenance procedures. If the maintenance problem that is reported by the station master is not within their budget, they have to send a new budget request to the headquarter, and the process and duration to receive the fund, depending on the amount of fund may vary starting from 1 month up to 11 months. Another issue that the maintenance Manager faces is a lack of manpower and in-house maintenance staff which will cause delays in the Maintenance of other stations. For instance, there are 11 stations and only two maintenance team available, when there are more requests for Maintenance than the available maintenance team, Delay would accrue.

The two maintenance team also manages all other regular maintenance. Every day from morning until afternoon there is cleaning services located at every station, and they work during the office hours as full-time staff. Moreover, all the routine maintenance is handled by the closest maintenance department to the other stations. The main reason that every station cannot have in-house maintenance department is due to the budget constraint that the facility manager face. When there are not enough budgets to hire new staff, they have no other choice but to divide the maintenance department based on the strategic location to have a close department in every station. However, this procedure will have a disadvantage which is a delay in deploying the maintenance team if there are an overwhelming request for maintenance from many stations.

2.5 Building Maintenance Defined

Buildings and Infrastructures are the country's most valuable resources. They provide shelters for people and places for people to work, live or to have fun. The maintenance of the building must start from the first day that the project starts. Factors such as design, material specification, workmanship, usage and expected life cycle of the building will define the amount of the maintenance that will be required during the life cycle of the building.

British Standard BS 3811:1993 defines maintenance as "the combination of all technical and administrative actions, including supervision actions, intended to retain an item in, or restore it to, a state in which it can perform a required function". From this definition, we subcategorize maintenance into two parts.

- The combination of technical and administrative actions which is the initiation in the building maintenance team that will form a building maintenance department. They will have advisory function, organizational function, and operational function
- Retain the time or to restore it to the state that can perform the required function. This includes repairing or replacing an item as long as it can perform the function that is required to do

However According to the business dictionary the maintenance is defined as: "Activities required or undertaken to conserve as nearly, and as long, as possible the original condition of an asset or resource while compensating for normal wear and tear" (businessdictionary, n.d.). From this definition, we can define what is the actual meaning of building maintenance. Building maintenance is the process of preservation and conservation of the building as close as possible to its original condition when it was built; however, there is always compensation to consider due to wear and tear.

2.5.1 Classification of Building Maintenance

According to figure 2.1, types of maintenance include the following (Arditi, 1999) :
Service Maintenance: it includes maintenance items that are requested by the occupants, it also includes the emergency situations where the occupants require emergency maintenance of an item.

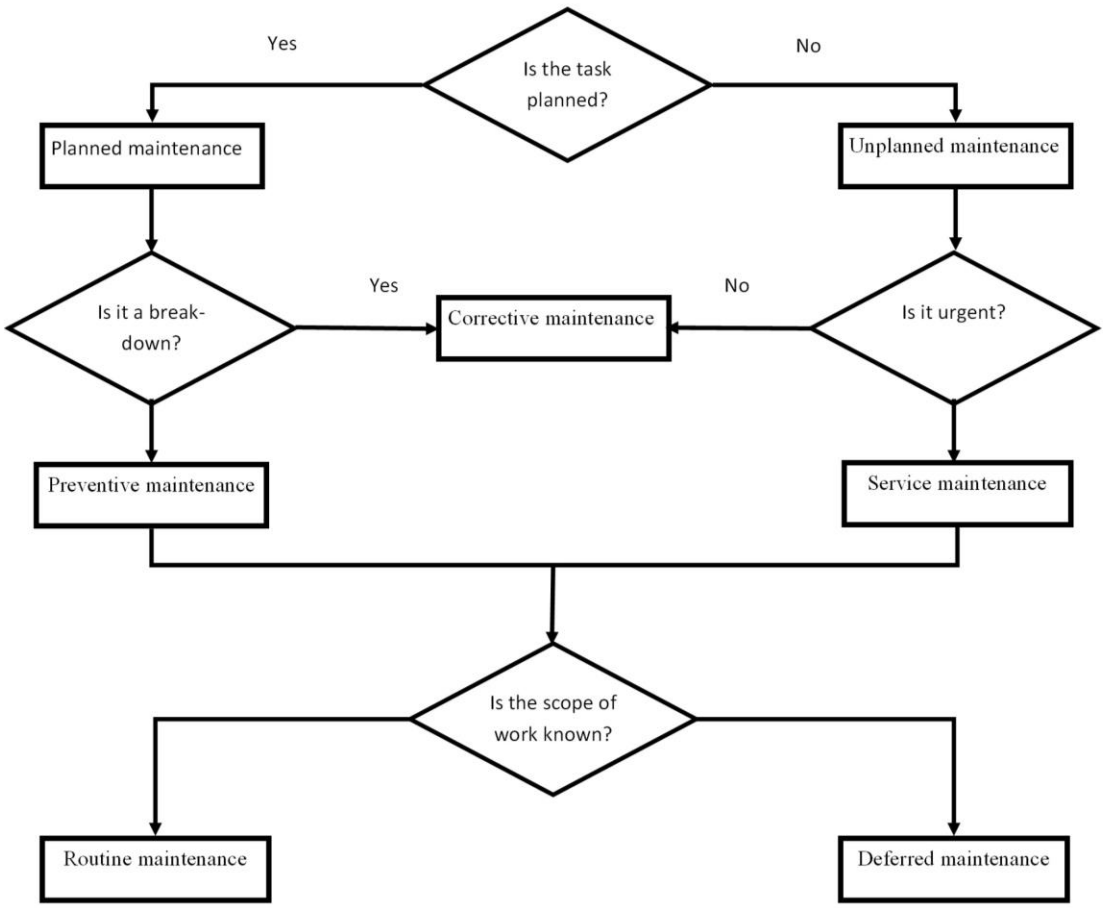


Figure 2.1 – Maintenance Classification

Routine maintenance: It is based on general maintenance of the common areas. These items are not requested by the client or occupant but are needed to keep the building in good condition.

Preventive Maintenance: a professional Building manager or maintenance manager is hired to understand that major breakdown in the buildings that can be prevented. Preventive maintenance keeps the building operating at peak efficiency through

regular inspection and repair. The aim is to check small problems before they become big and expensive.

Corrective Maintenance: it is consisting of maintaining building and equipment due to natural wear and tear or faulty preventive maintenance. With equipment problems, there may be a discussion as to whether the item should be repaired or replaced. This depends on the life cycle of the equipment after further maintenance, and whether or not by purchasing new equipment the cost could be reduced.

Deferred maintenance: once in a while the necessary maintenance is stopped until further instruction. This is called deferred maintenance. The delay to this might be due to budget constraint, or the availability of the parts and equipment that is necessary.

2.5.2 Basic Functions of Building Maintenance

To be able to maintain a building, basic functions of maintenance must be discussed. Below is the list of basic function of maintenance:

1. Cleaning and servicing
2. Repair and replacement of items
3. Renovation
4. Correction

Clearing and servicing are usually done based on regular interval depending on the types of building and how rapidly the area would require the cleaning. In train stations where there would be about one thousand people traveling every day would probably need daily cleaning.

The maintenance team is responsible for repairing or replacing the item which is damaged due to wear and tear or faulty in design, to its original condition.

However, whether the item should be replaced or repaired is depend on the current condition of the item and the life cycle of the item after the repair work was done.

The maintenance department can also take part in the renovation of the building. If there is a need for restoring of the building structure design or an item to its original condition or if there is a need for general renovation of the building, the in-house or outsourced maintenance team could be used to carry out the work.

Correction of work usually will happen in the early life cycle of the building which could arise from the faulty in design or if some of the component and material that were used was not entirely compatible with other materials, and they should be changed to avoid unnecessary cost in future.

2.5.3 Building Maintenance Organization

"The term maintenance department is used to describe the person or persons responsible for the planning, control, and execution of the maintenance operation." (chanter & swallow, 2007) The maintenance department can be in-house, or all the maintenance activities could be outsourcing and carried out by external contractors.

According to (chanter & swallow, 2007) there are three (3) main parties that are identified to produce a generalized classification of the maintenance organizations according to the degree of domination that is applied by one or other parties who are involved in the process.

- Occupant dominant type

  The main focus of this kind is to provide speedy service to the occupants where the occupant request initiates the work.

- Owner/client dominant type

  The main goal here is to:

  a. Maintaining the value of the property

b. Keeping cost as low as possible
c. Ensuring that property is let or utilized as soon as possible

- Professional dominant type

  When this group has dominated the style of the management will reflect a sympathetic attitude to the maintenance need of the building. For example, when they dominate, they will have a strong emphasis on planned preventive maintenance program which will reduce the amount of random or emergency work through proper care. If this is applied strictly, the control on maintenance will be based on achieving the best quality. However, the limitation and disadvantage would be in some cases; it may result in unnecessary work to be carried out due to the obsession and sympathetic attitude of the professionals toward the quality of work.

According to (chanter & swallow, 2007) the maintenance department has these three functions: Advisory functions, organizational function, and operational function.

Advisory functions are involve communicating and cooperation with owners and the consultation with the management to advise on matters such as:

- The productions of as-built drawings and maintenance manuals
- The required performance of the building in general
- Provision of specialist advice on areas such as refurbishment and extension and modification
- Advising the senior management about the need for a proper maintenance department to ensure the quality of the building during the life cycle of the building.

The organizational function is with consideration done by the internal function and external function.

1. To form the function of the basic internal system, some factors must be clearly defined such as:

- Role and responsibility of the building maintenance manager
- Communication channel that is required for the maintenance department and the client or the occupier of the building
- Chain of command and accountability of the department. There must be one person in charge and one person to take the risk and to be responsible for the duty and his role as the maintenance manager
- The standard procedure that needs to be followed for every building.

2. To properly define a protocol to deal with the external organization, there must be careful consideration to be planned as communication of information will be a challenge. Whether it is written or oral, the information technology is critical importance when dealing with the external organization.

The operational functions could be carried out in-house or by an external agency. The operational functions are consist of:

- Identifying the work input
- Programming the work
- Ensuring the work is executed
- Monitoring and controlling time, cost and quality
- Authorizing and arranging payment
- Providing management information including feedback

Maintenance department has critical functions in the life cycle of the building. The maintenance department can start working even before the project is done. During the design stage of the building, the maintenance department has a great role in advising the client and consultant about maintainability of the structure. Factors that can lead to maintenance issue are basically due to poor design, poor workmanship and quality of material.

All these factors that lead to maintenance issue could be avoided if there are proper maintenance team present during the execution of the design process and they can give advice to the relevant parties to avoid unnecessary cost for maintenance. Many times people think that the poor maintenance team causes poorly maintained building, part of this could be true if the maintenance team neglected by repairing or changing an item or if their response level is not fast. However, there will be issues arising when an item has been replaced or repaired for a number of times, and still the same issue will arise in the maintenance of the component. This is due to the specification that was provided to the maintenance department by the owner or the client. In this case, the material that is being replaced, is not suitable for the item that is being changed, no matter how many times its being changed the same issue will persist.

So to avoid this kind of issue, there must be a clear line of communication between the maintenance department and the owner. Moreover, issues arising from the incompatibility of some materials with some items could be easily avoided if there is professional maintenance team present during the design stage to advise on the matter.

2.6 Methods in Budget Allocation of Building Maintenance

In current practices, whether it is based on planned or unplanned maintenance, the budget becomes the main topic of discussion and constraints. Most research findings show that maintenance is not carried out according to actual need, but are based on the allocated budget without making any evaluation of the actual needs of the maintenance work (Horner,El-Haram and Munnus 1997). The budget should be determined based on the type and implement the strategy of maintenance.

According to Bahr and Lennerts (2010) who conducted a special investigation in the building maintenance budget in Europe found a variety of common budgeting methods that were used from 1952 to 1984. This method can be divided into four. The first method is "Key figure-oriented budgeting", the second method is "Value-oriented budgeting" while the third is "The analytical calculation of maintenance measures" and the fourth method is "Budgeting by condition description". Bahr et.al. (2010) also introduced the new findings called adaptive practical budgeting of maintenance measures (PABI) as new approach leads to the development of a new budgeting method.

The key figure-oriented budgeting is basically based on the previous maintenance cost of the building. In this type of budgeting, the cost of maintenance will be estimated based on the gross floor area per square meter (GFA/m2). This method has been used for cost estimating of building element and it is used for estimating the maintenance of buildings with similar characteristics.

Value oriented budgeting is based on fixed percentage of the value of an item. For an instant, if an item is costs Rm100,000, there will be fixed percentage of 10 percent based on the total amount of the item which would be 10,000 as the cost of maintenance.

The analytical calculation of maintenance measures the exact detail cost that is required for maintenance based on each individual cost of maintenance for all

items. The amount of the budget would be the total amount needed for maintenance of all the items available.

The budgeting by condition description is based on the need for the maintenance after an inspection is done. There will be an inspection of the item and its need for maintenance, and the budget would be allocated on the spot based on the periodic inspection done.

2.7 Maintaining of Britain Railway Stations

Britain's 2,507 railway stations vary widely in size. Each of the 28 largest stations is used on average by 90,000 passengers a day, and each of the 1,200 small unstaffed stations by just 100 passengers. Seventy per cent of all rail journeys are made from the busiest 10 per cent of stations. In Britain, all of the railways stations are franchised stations to 22 Train Operating Companies. However, privatizing the stations did not completely solve the issue of maintenance and passenger's satisfactions with the stations.

The Strategic Rail Authority (SRA) has had a vital role to play in stations since the government established it in February 2001 to deliver strategic leadership to the railway industry. The Office of Passenger Rail Franchising (OPRAF), minimum standards, including facilities and services required at franchised stations, monitored compliance with requirements and helped fund stations' operation and improvement. Other public and private sector organizations also play a part.

To improve passenger rail services, there was reported fall in passenger satisfaction with the station environment since the privatization of the stations. In this report, whether passengers are satisfied with station facilities and services and whether station requirements are being met was examined and also the barriers to station improvement and what is being done to overcome them. The method that was used was on-the-spot surveys of a cross-section of 120 stations across Britain to assess the facilities and services provided. The surveys covered the basic contractual requirements at franchised stations as well as the services and facilities that passengers might reasonably expect to find at stations.

2.7.1 Passengers satisfaction

The SRA was required to secure increased levels of customer satisfaction with the quality of stations. There has been a little improvement in travelers' satisfaction over

recent years. National Passenger Survey data show that satisfaction increased from 59 percent to 63 percent between 1999 and 2005 and that passengers have been consistently more satisfied with stations. Passengers are reasonably pleased with the 95 largest stations, which carry more than half of all rail passengers each year, are staffed and have a range of facilities. They are least satisfied with the more than 2,000 medium-sized and small stations that are unstaffed, or are staffed for only part of the day, and that have few facilities.

Satisfaction with station facilities and services also varies. Passengers are most satisfied with passenger information, staff assistance at stations and, at staffed stations, connections with other forms of public transport and ticket-buying facilities. However, levels of satisfaction are lowest for station facilities and services, the overall station environment, cleanliness, upkeep and repair, personal security, and station car parking. Moreover, more than half of Britain's stations are not entirely accessible to physically challenged people. Dissatisfaction with the station environment and station upkeep and repair can be attributed, in part, to most stations being over 100 years old. However, there are also problems in maintenance and repair arrangements while the measures of station condition prescribed for Network Rail focus on structural elements and take insufficient account of the station environment and its appearance which are necessary for passengers.

Research carried out by the Department in 1996 and 2002 suggests that improving personal safety would result in 15 percent more journeys by train (and Underground), much of it outside peak hours. The SRA has supported national schemes promoting good practice in station and car park security.

2.7.2 Budget Constrains

There are various sources of funding for the maintenance, repair and renewal of stations, involving a complex flow of taxpayer subsidies together with income from passenger fares and commercial concessions such as shops and cafés at stations. The amount that was spent was estimated, in 2003-04, over £420 million was spent

on day to day maintenance, cleaning, and operations of stations. However, there is a cost that will come with meeting higher station requirements and improving station facilities and services.

There is a trade-off between the quality of station facilities and the level of passenger fares. The SRA considered that, when satisfaction with the value for money of the price of a train ticket has remained within a range of 41 per cent to 44 per cent over the period, the gradual rise in passenger satisfaction with stations supported its approach to maintaining and improving stations where funding and value for money considerations permitted.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

In this chapter, the types of research that can be used in a different situation will be discussed. Every research method is suitable for various type of topic. There are many types of research methods that can be used when doing research. However, the type of research method to choose is based on how this approach can help in achieving the objectives of the research and how this approach is suitable for the collection of data and analysis of the result.

3.2 Types of Research

Fellows & Liu (2008) categorized research styles into action research, ethnographic research, survey, case studies, experiments, quantitative and qualitative approaches. Each of these styles can be used for explanatory or descriptive research. However, choosing the most appropriate research style is based on the type of research operation (what, how, why), the amount of control that the researcher has over the variables and if the focus of the research is in the past or current time (Fellows & Liu, 2008).

Action research is used to give suggestion and test solutions to a certain problem, the solutions and suggestion given will fall under applied research and the

process of identifying the problems will lie under basic research. Active research is where the research intentionally tries to make a change in a social system (Fellows & Liu, 2008). Participants that take part in action research find it to be an empowering experience; this is due to one of the characteristic of action research which the research is always relevant to the participant.

Ethnographic is a study of races and cultures, and this approach has less intrusion by the researcher. In this type of research, the researcher becomes the part of the group and starts to study and observe the group's behavior. The researcher will mainly focus on what, how and why their pattern of behavior will occur.

Surveys mainly work on statistical sampling and only in a very rare condition the full population survey is possible. In survey usually the samples are surveyed by questionnaires or interviews. Either the methods of surveying the samples are questionnaires or interviews; the subject of the study must be introduced to the respondents. In this approach, considerations must be given to the respondent rate. The respondent rate is the percentage of the subjects who respond to the questionnaires or the interview. The number of responds obtained from this method is important in collection and analysis of data.

Case studies will focus on detailed analysis of a limited number of conditions and their relationship in the research. When there are resources constraints in the research, case studies can be selected as a representative of similar condition to those that were used in sampling to achieve a representative sample or to show numbers of alternatives.

Case studies research can be situations, such as negotiation of wage or determination of safety policies, and for these types of research several cases may be studied by the researcher or it could be a combination of methods of ethnography, action research or an interview.

Experimental research style is suited best for problems and issues where the variables which are involved are known or at least have confident hypotheses. These types of researches are usually carried out in laboratories to investigate the

relationship between variables by holding all of the variables except one that is constant and examining the effect of the constant variables on the dependent variable by changing the independent variables.

3.3 Research Method Chosen

The research method that was chosen for this research is cased study. Cased study method is based on research done on one case which can represent the rest of the cases with similar characteristic. In this research, the respondent of the case study is only one person who is the facility manager of 11 railways stations.

There are always advantages and disadvantage in different types of research methods. There is no perfect method for research which are flawless and perfect. Some disadvantage in case studies is there could be bias in data collection procedure since the person that is providing the data is only one individual. Moreover, a case study will require face to face communication and in-depth interview with the respondent which it might have to be done in few sessions. So case studies could consume more time to collect and analyze the data comparing to other types of methods.

Data collection for this research were based on an in-depth interview with the facility manager of 11 railways stations. The questions asked were based on methods of maintenance that takes place and budget allocations methods. Data analysis relies on the actual need of maintenance and the budget that was spent on unnecessary maintenance. According to many research, maintenance that is done is mostly based on the budget that was allocated for the maintenance. Even if there is no need for maintenance, if there is a budget for it the maintenance will take place; this could lead to higher expenditure on building maintenance where it could be avoided by properly managing the cost and budget.

3.3.1 Case Study Method Constrain

One problem that always exists with case study method and it is always being criticized is that the case study provides little basis for scientific generalization. People often question how the person who conducts the case study can generalize from a single case. However, this is not the issue only with a case study, and this question has been asked regarding experiment research, that how can they generalize from a single experiment. The short answer to this is that case studies, like experiments, are generalizable to the theoretical proposition and not to populations. In this research case study method does not represent a sample, and the goal is to expand and generalize theories and not to statistical generalization. In this case, study the focus is more on generalizing and not particularizing analysis.

Another common complaint about the case study research is that they take too long to get the result and at the end the result are in massive and unreadable documents. However, in this research which was conducted in 11 KTMB stations, this does not apply since the collection of data and analysis is only based on a limited number of the station. This limitation is due to the accessibility of resources and difficulty in attaining information from other stations.

Case study method is a kind that will always be criticized. However, there are actions that could be done by the researcher to limit the constraints that case study has and generate a legitimate and proper research from this method. In this research, the case study will be conducted among the 11 KTMB stations which will represent the other 45 stations across the country.

3.3.2 Research Questions

Research questions were established which could be referred during the course of the research. The focus of the study had been established by forming questions about the situations and the problems that was studied. The case study research questions that were developed would answer few questions with “how” or “why.” Below are the research questions that will be answered in the next chapter, “Results and Discussions.”

- Why the cost of station maintenance increased after the reconstruction of new stations
- How lack of maintenance consideration during design stage impact on maintenance cost
- Why Malaysian’ Railway Stations have low standard of building maintenance
- How poor maintenance practices affect the standard of building maintenance in railway stations

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Introduction

In this chapter, the results of the case study interview that was conducted will be analyzed and discussed. The KTMB facility management is located at Ipoh Heritage KTMB station. The Ipoh station was first built in 1917 by British architect Arthur Benison Hubback, who designed several important building in Malaysia such as Federal Secretariat (Sultan Abdul Samad Building) and Selangor national museum. (The Singapore Free Press and Mercantile Advertiser, 1917)

The case study research was conducted at one of the KTMB facility management offices who is in charge of 11 KTMB stations from Behrang station until Padang Rengas Stations (Table 4.1). All these stations are within the Perak State. This case study was conducted on these specific 11 stations due to accessibility and availability of data and resources.

Table 4.1 – Stations Information (Measurements are estimated by google map)

Station Name	Year of Construction	Stop station	Station Area (m^2)
Padang Rengas	2014	**No Stop**	**750 m^2**
Kuala Kangsar	2008	**Have Stop**	**1200 m^2**
Sungai Siput	2015	**Have Stop**	**750 m^2**
Tasek	2007	**No Stop**	**750 m^2**

Table 4.1 (cont.) – Stations Information (Measurements are estimated by google map)

Ipoh	1917	**Have Stop**	**1350 m^2**
Batu Gajah	2007	**Have Stop**	**960 m^2**
Kampar	2007	**Have Stop**	**1575 m^2**
Tapah Road	2007	**Have Stop**	**1575 m^2**
Sungkai	2007	**Have Stop**	**960 m^2**
Slim River	2007	**Have Stop**	**960 m^2**
Behrang	2007	**Have Stop**	**1280 m^2**

As its stated in table 4.1, not all the stations have a stop; meaning that the train does not stop at that station when it passes by. The two stations that have no stop are those which require the least maintenance due to a limited number of people using the facilities in the station. However, there are still full-time staffs located at every station even if it has no stop. These staffs are including cleaning services, stations staff and station master (Basri, 2016). In every other station that has stop, there are two shifts of cleaning staff. One shift work during office hours from 8 am to 6 pm and second shift work during the night from 9 pm until 5 am.

4.2 Background Information on Department of Facility Management

The case study research was conducted at the Department of facility management in Ipoh KTMB station with Mohd Kamarul Isma bin Ahmad Basri one of the executive facility managers. The interview was conducted in Malay language and due to the language barrier between the researcher and the interviewee; Ms. Tan Ze Lene translated the interview to English. The main objective of the interview was to determine maintenance practices in KTMB stations and to determine the method of budget allocation for the maintenance department. KTMB was privatized in 1992, and it receives 45% of their profits from the private sector, and the other 55% is received from Government Company called “Malaysian Institute of Accountants.” (Basri, 2016)

The Ipoh maintenance department is responsible for maintaining 11 KTMB stations from Behrang Station until Padang Rengas. All these stations are located in Perak state. The maintenance department will manage all the maintenance activities in these stations as well as quarterstaff for the KTMB employees. The Ipoh maintenance department is consisting of total 12 staffs which are located at two different locations. There are nine staffs located at Ipoh branch which will take care of all the maintenance activities from Kampar station until the last station at Padang Rengas. The other three staffs are located at Tapah Road stations that are responsible for all the maintenance work from Behrang station until Tapah Road station. However, these staff does not include cleaning staff as in every station there is one cleaner who will work full-time during office hours from 8 am to 6 pm. There are two stations that it has no stop for trains, and its only used for cargo services and maintenance of certain trains and some of the broken trains will be parked at these stations. The other nine stations which have stop will have another full-time staff who will work during night shift as cleaner.

There are 3 of the staffs in Ipoh branch who are consisting of the facility manager En Rohizam, Acting Technician En Mohd Kamarul, and clerk. These three staffs are always on call 24/7, and if there is any emergency case the clerk will be informed first and after that, the message will be passed to the facility manager and executive facility manager.

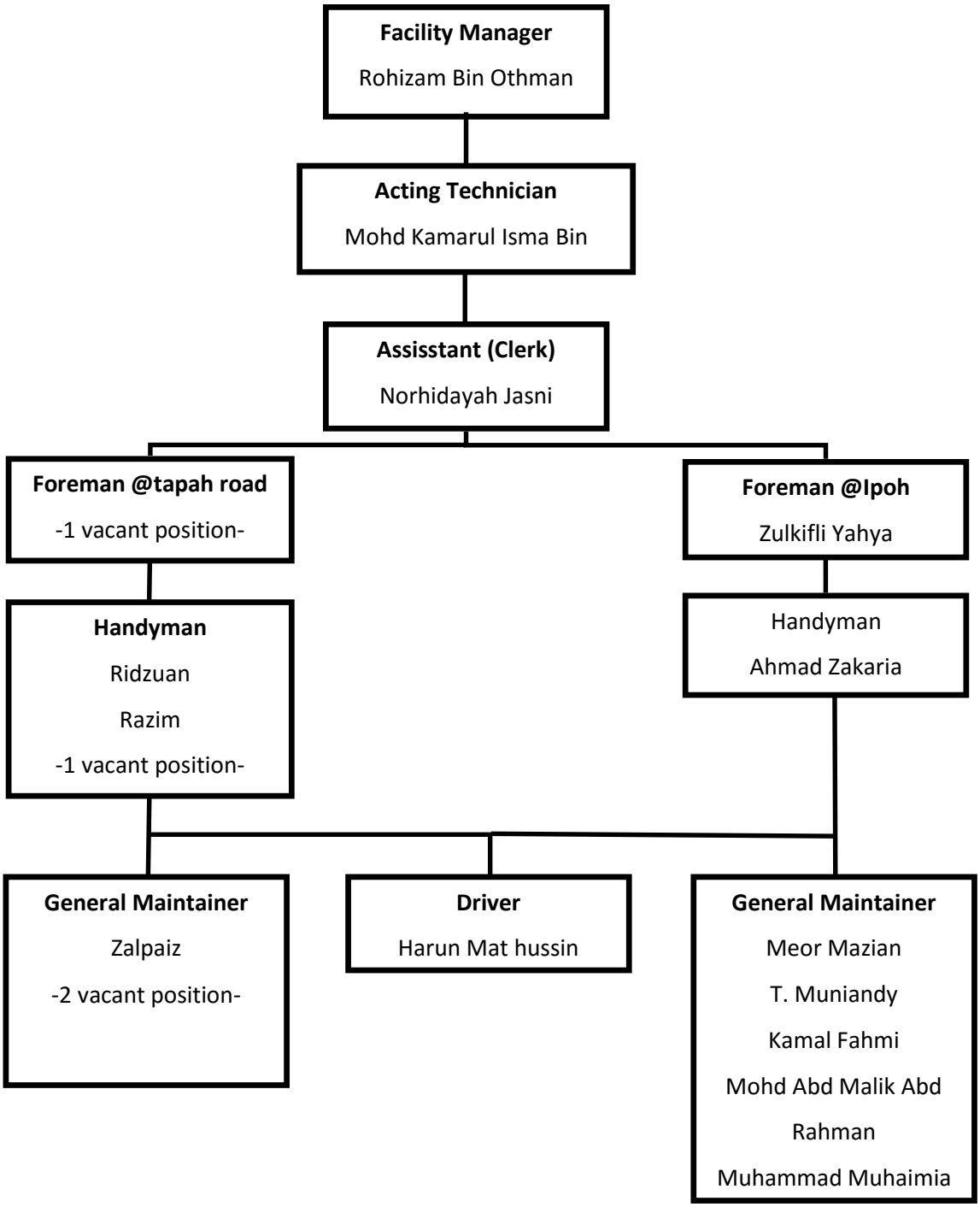


Figure 4.1 – Organizational Chart (Translated from Bahasa Malaysia)

According to Figure 4.1, the organizational chart of Department of Facility Management there is a total of 11 general maintenance worker and handyman, which are further divided into two teams. A team with three members is taking care of 4 stations from Behrang to Tapah Road and the other team with nine members are responsible for maintenance of Kampar station until Padang Rengas.

Maintenance records are kept in paper form and every day the clerk fills it in. In the daily record, the task that was performed and the name of the person who did the job including date and attendance will be mentioned. Every day the record will be added to the maintenance record file, and it will be kept and categorized by year at Ipoh office.

Table 4.2 – Sample of Daily Maintenance Report

No	Staff Name	Date	Attendance	Task performed
1	XXXXXX	03/02/2016	Present	Clearing the gutter and drainage at stations Tapah Road
2	XXXXXX	03/02/2016	Present	Repair work of damped suspended ceiling and solve the roof top leakage at Ipoh Station
3	XXXXXX	03/02/2016	Present	Repair rusted water tap at Kampar station
4	XXXXXX	03/02/2016	Present	Repair damaged wall due to leakage of inside pipe at slim river station
5	XXXXXX	03/02/2016	Absent	-
6	XXXXXX	03/02/2016	Present	Unclogged sewerage system and remove debris from the manhole at Batu Gajah station

4.3 Data Collections and Observations

The maintenance department has two main structures to maintain. First is all the 11 KTMB stations that they are assigned to maintain and the second is to maintain all the staff quarters. Many of the KTMB employees are provided with accommodation close to the stations that they are working, and the facility management of Ipoh station is responsible for maintaining all the staff quarters as well as the stations.

The maintenance department is responsible for the sewerage system, landscaping, HVAC system, structural maintenance and clearing roof from any substance that accumulate water. Due to the high voltage in every station, the maintenance department does not carry out any maintenance work regarding electrical services. Any electrical maintenance is carried out by Tenaga National Berhad (TNB) under strict supervision to avoid any accidents.

Official working hours for maintenance department are from 8 am to 5 pm Monday to Friday. However, the three staffs that are consist of the Clerk, facility manager and acting technician are on call 24/7 to receive any emergency request. The clerk will receive any other requests that are received other than working hours and are not within the emergency category and the requests will be categorized according to the priority on the next working day and will be distributed to the staff. All the requests are received through SMS, what's app or email, and after it is categorized based on priority, it will be passed to the related maintenance workers. After each team is assigned to a certain task, they will be deployed to the specific station with a lorry to carry out the maintenance work. Upon arrival, the maintenance team must take a picture of the current situation, and after the maintenance work is completed, they are responsible for photographing the work done and submit to the clerk for further documentation.

Requests are responded based on the priority of the situations. Requests that does not have any life threatening characteristic and are not categorized under emergencies will be responded within 24 hours from the request date if it is within

the allocated budget and any other emergency request will be responded within 2 hours from the received date of the request.

4.3.1 Maintenance Procedures and Practices

The Department of Facility Management in Ipoh station conducts a Regular Inspection on all the stations every two months which will take about two weeks to be completed in all the station. The acting Technician (Technician) is responsible for conducting this inspection accordingly every two months. The technician will take one person with him and start traveling to inspect all the stations.

4.3.1.1 Regular Inspection of Stations

The main objective of the inspection is to find out what needs to be changed or repaired and if there is any part of the structure that requires attention. In general, during the inspection, every part of the station structure will be examined to identify any structural defects. Other than that, cleanness of the stations will be examined, and if there is any issue in regarding that, the Stations master will be informed to take action to solve the cleaning problem as the cleaning staffs are under every station master, and they work full time.

All building materials deteriorate with age and exposure to the weather. Through routine inspection, the facility manager can determine which part of structure require maintenance to avoid higher cost for replacement due to the damage that could have been avoided. By doing this, the useful lifespan of a building will be greatly increased. The principal reason for developing this building inspection is to inform the stations masters regarding the maintenance issues that the structure is exposed and could be prevented to reduce further cost. According to Table 4.3, the regular inspection of the station consists of the following components.

Table 4.3 – Regular Inspection

Inspection Components	Details of the inspection work
Roofs	Check for any damage on roof shingles on the ridge, hips, and at roof edges. Check for clogged roof gutter to avoid water accumulations. Attention to gutters that are clogged with debris, lose gutters and broken gutters.
External Wall Material	Check for horizontal and vertical cracks. On brick wall check for lose mortar joints, stain and water spot on the wall to identify if there is water leakage from piping
Exterior Ceilings	Moisture problem in exterior celling indicate faulty drainage from the roof above. Insure proper inspection of the roof to make sure water does not penetrate the structure of the building. Look for: peeling paint and water stain on the ceiling.
Grounds	The ground should be properly graded to direct the flow of rainwater away from the building. Check for any drainage and sewerage manhole that are clogged. Check for debris blocking the drainage, damaged drainage. Drainage and sewerage system must be inspected during heavy rain.
Plumbing and Mechanical System	Check for any type of water mark on the walls which are due to rusted or worn out Galvanized Iron pipe. Check for all the air-conditioning piping to insure there is no energy lost. Inspect the water supply and waste pipes for rust and leaks.
Interior Inspection	Look for cracks, settlement or leaning in the concrete walls. Check for cracks on columns of the structure, on the concrete floor check for spaced crack and cracks near the walls, surface dusting and cracks near the columns.

4.3.1.2 Maintenance Complains and Requests

According to the figure 4.2 and with a reference to the interview conducted the maintenance procedure of a single request is illustrated.

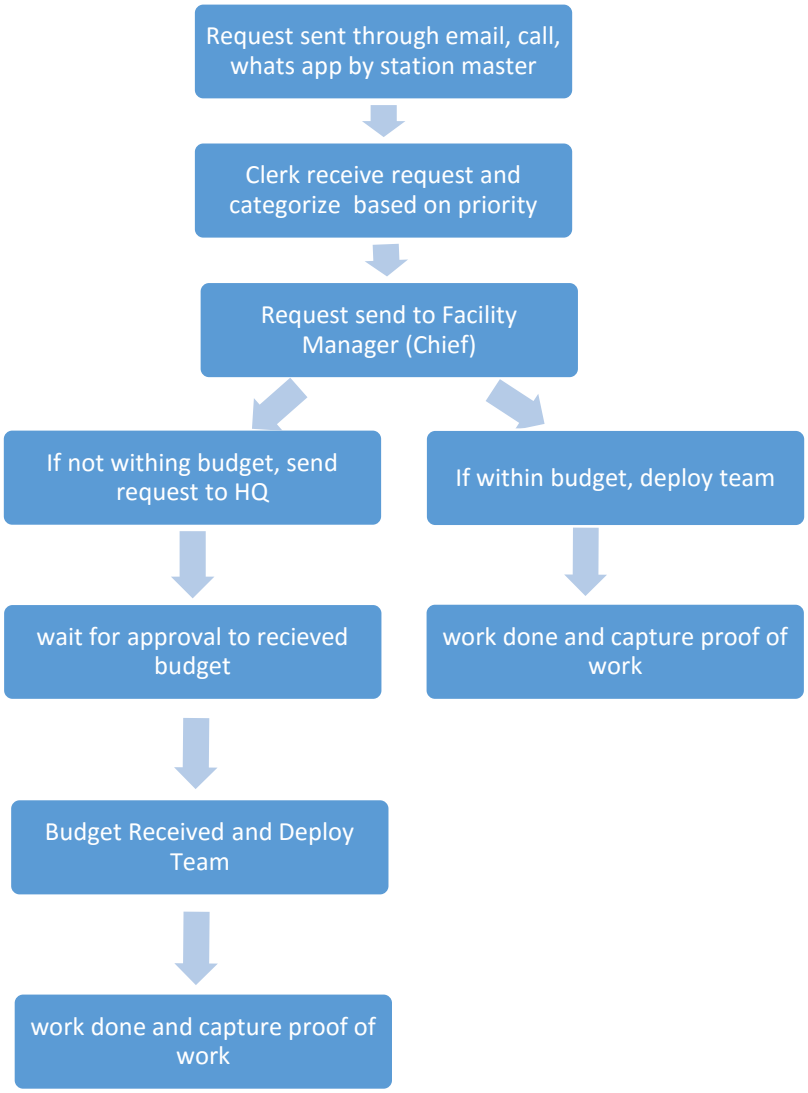


Figure 4.2 – Maintenance Request Flow

Everyday maintenance requests will be received from all the 11 station masters to the clerk by email, call, SMS or What's App. The clerk will receive the request and categorize the request according to the maintenance priority. If its emergency maintenance, the chief will be informed immediately regarding the matter, if its normal maintenance request such as clogged drainage or sewerage system the

requests will be sent to Facility Manager (Chief) for review. The chief will review the request according to the allocated budget, if the request is within the budget, a team will be deployed to conduct the maintenance work. Once the maintenance work was done, the maintenance team will capture the proof of work and send to the Chief. After Chief receives the request, the maintenance case will be closed. However, if the request is not within the allocated budget, the Chief will send a request to the KL office and upon approval of the budget, the Chief will deploy the team. If the request is not within the budget, the process for the maintenance will take very long time from 1 month up to 11 months, depending on the when the next year budget is going to be allocated.

One of the issues in this maintenance practice is that the station master who is the user, in this case, does not receive any notification of work done, and he cannot comment about his satisfaction toward the maintenance work. Other than that there is no channel for passengers and users of the stations such as the employees who work in the station or the passengers who are traveling to be able to address their opinion regarding the current maintenance condition of the station. The maintenance request flow should be a cycle rather than linear. If the user who in this case is the station master is not satisfied with the maintenance work, the flow would go back to the top and start from beginning to send a team and rectify the unsatisfactory job. Once the user is satisfied with the work, then the case could be closed.

4.3.1.3 Safe Maintenance Access

All the KTMB stations are equipped with three-phase electric power for the distribution of power to the electric train (ETS). All the employees will be fully briefed regarding the locations of the high power supply, and they are advised to avoid any contact with the power supply by working around the cables as much as possible to ensure the safety of all the maintenance worker, before conducting any maintenance work. The electrical service of the KTMB is not done by the maintenance department due to the lack of safety training to handle high power

supply and all the electrical maintenance even small work is done by Tenaga Berhad (TNB).

4.3.1.4 Emergency Maintenance

Due to the geographical location of Malaysia, there are many accidents that could happen in the stations by an act of God, such as flood, falling tree, lightning strike and collapsing of the ceiling. The management team of the maintenance department is on call for 24/7 to take care of any Emergency Maintenance that is reported by the stations master or any other employees. According to the interview with the acting technical, they revive one emergency request every two months and most the time is a fallen tree.

The management team will receive the maintenance request directly from the stations master or the employees and even if it is not within the working hours, they are responsible for attending to the issue immediately. If the stations are badly damaged by the fallen tree or the flood, the station will be closed for a period until the case is solved. Usually, the emergency maintenance will be solved within a day.

4.3.2 Procurement Methods

KTMB Facility Management Department in Ipoh is conducting all their maintenance work in-house, and they do not outsource any maintenance work for all the 11 stations. The department only outsources contractors to supply materials and goods, and all other maintenance work is handled by the in-house team who are consist of a total of 15 staff including driver and the management team.

The management team will receive and an average of 2 maintenance request from stations master per day and the maintenance work will be conducted based on the availability of the budget. However, the limited amount of workforce does not cover anything more than two requests per day, and if they receive more than two

requests, they have to postpone the maintenance procedure to next day. Lack of any outsourced maintenance team is the main disadvantage of fully in-house maintenance, where all the work is a bear on the in-house team. For all the 11 stations the department has only two handymen who are responsible for controlling and managing all the maintenance workers. The number is very limited to be able to conduct maintenance work for all the 11 stations efficiently. So to complete the work and reduce manpower need, most of the maintenance works done in a rush which leads to a not satisfactory job.

4.3.3 Budget Allocations

The Headquarter of Department of Maintenance in Kuala Lumpur will receive maintenance budget from government and private sector every year. Malaysian Government contributes the 55 percent of the budget given to the KTMB maintenance department under Malaysian Institute of Accountants, and the other 45 percent is received from 5 other shareholders of Keretapi Tanah Melayu Berhad. (Company Overview of Keretapi Tanah Melayu Berhad, 2016) Table 4.4 shows the detail of shareholder and the percentage they contribute in budget allocation.

Table 4.4 – Parties Contribution in Budget Allocation

Name	Shared Percentage	Title/Company
Sarbini Tijan	9 %	President and Director
Nawawi Bin Hj. Ahmad	9 %	Keretapi Tanah Melayu Berhad
Sarbini Tijan	9 %	Keretapi Tanah Melayu Berhad
Zakaria bin Hj Bahari	9 %	Keretapi Tanah Melayu Berhad
Tuan Haji Rosli bin Abdullah	55 %	Malaysian Institute of Accountants
Selvarajoo	9 %	Keretapi Tanah Melayu Berhad

The yearly budget received by the Headquarter is distributed among the entire maintenance department in Malaysia. The budget is allocated according to the previous expenses on the station's maintenance, and if there are any expenses outside the budget, it will be received on next year budget allocations which could be from 1 month up to 11 months.

4.3.4 Factors Affecting Maintenance Cost

Based on the interview with acting technical of Maintenance department at Ipoh KTMB stations, table 4.5 show the factors that could affect the cost of maintenance in KTMB stations.

Table 4.5 – Factors Affecting Maintenance Cost (1 highest/ 5 lowest)

Cost Factors	Rank
Building Condition	1
Age of The Structure	1
Faulty Design	2
Size and Area of the Structure	2
Building Material	2
Third Party Vandalism	2
Poor Workmanship	2
Requests from The Station Master	3
Safety and Health Requirement	3

Table 4.5 (cont.)– Factors Affecting Maintenance Cost (1 highest/ 5 lowest)

Poor Maintenance Tracking	3
Poor or Lack of Training of Station Staff	4
Delay and Failure Reporting Maintenance Problem	4
Type of Finishes	5

The condition of the building and the age of the structure have the highest impact on the cost of maintenance. If the building is not in good condition and if its old, this indicates that there will be special maintenance need for that certain structure, and this will certainly affect the allocation of budget and increase in maintenance cost for the coming year.

Other factors such as vandalism by the third party, quality of material and poor workmanship when building the structure has the second highest impact on the maintenance cost. If the third party vandalism damages the structure, it will require the further budget to repair the parts that were damaged.

The quality of materials for building new stations is below standard, and they broke and required more maintenance than the old stations. (Basri, 2016) Choosing a low-quality material to construct the new stations to reduce cost, has increased the budget needed by the maintenance department as the new material require rapid repair and replacement compare to the old one. For an instant, the pipes that were used in the new building get rusted and corrode faster compare to the pipes were used in the old station. The old stations were built in the 1950s.

4.4 Data Analysis and Discussions

The maintenance practices observations were discussed and observed in the previous section. However, some issues still persist, and the facility manager of KTMB station faces these issues in carry out every task. There are factors that affect the allocation of budget, such as maintenance practices and types of procurement that the facility management department undertake. To achieve the best result, the facility manager has to overcome all these problems and come up with most efficient and effective way to manage all the 11 stations. The main priority of the facility manager is to reduce waiting time and conduct the maintenance task as soon as possible and the second priority is to reduce the maintenance cost as the allocation of budget does not include any new maintenance work which is out of the scope of the budget.

4.4.1 Issues in Budget Allocations

The maintenance department allocates budgets for maintenance work based on the previous maintenance cost. This method has an advantage of reducing unnecessary maintenance budget for the department of maintenance. However, there are limitations to this approach such as unreliable maintenance cost estimation for the next year and delay in further receive of the budget if the maintenance cost falls outside the allocated budget. If the cost of maintenance falls outside the allocated budget, the maintenance department has to request for the extra budget, and this will create a huge delay in completing certain maintenance work.

If maintenance task requires a further budget that is outside the allocated budget the facility manager of Ipoh station, have to send a request to headquarter to receive the budget, and this can take up to 11 months until the next budget allocation. This will create a significant gap in maintenance activity as that certain task has to put on hold until the budget is received.

Another problem with this method of budget allocation is that there is no accurate amount for the budget to be allocated. If the previous year there was less maintenance task to be conducted and the year after the budget is fixed base on the previous year, then the maintenance department is limited to spend money on maintenance activities.

4.4.2 Issues in Maintenance Practices

The department of facility management conducts maintenance work based on the corrective maintenance. If there is something that is broken a team will be deployed to address the problem and to carry out maintenance task. The maintenance management team also conduct a routine inspection to check if there is any part of the building that will require maintenance work. This falls under preventive maintenance as the management team will look for any part of the structure that requires special attention to avoid the further cost.

4.4.2.1 Maintenance Request Flow

As it was previously stated, the request flow for maintenance activities that are directly requested by the stations master does not have cycle flow and the station master who is the user, in this case, does not get notified regarding the activity that was done. Issues that arise from this practice are that if the work was done is not satisfactory by the station's master he does not get to comment regarding the task that was carried out. By doing this, the problem may still exist in future due to bad workmanship or lack of consideration from the station's master.

4.4.2.2 Corrective Maintenance

Corrective maintenance is generally referred to as repair (Olanrewaju & Abdul-Aziz, 2015). The maintenance department at KTMB stations conducts their maintenance based on corrective maintenance. If there is a problem, then it will require repair. If the item still functions, then has to wait until it is broken before the maintenance would take place.

4.4.3 Lack of Man Power

Another issue the maintenance department faces is a lack of manpower. The maintenance department has 15 staff which 3 of them are management team who are consist of the facility manager, acting technician, and assistant. The other 12 staffs are responsible for maintaining all the 11 stations. There is only one driver, so technically only one team could be deployed per day to conduct maintenance activity. One of the priorities of the maintenance department is to reduce manpower usage in maintenance activities as there are not enough handy man to control and manage the maintenance team. Lack of manpower will lead to poor performance of maintenance activities, and it will reduce the standard of maintenance work in KTMB stations.

4.4.4 Unrealistic Procurement Method

The maintenance department does all the maintenance activities in-house. Every maintenance task that is conducted in the 11 stations will be done by in-house maintenance teams that are located in Tapah Road stations and Ipoh station. The Tapah Road stations are responsible for four neighboring stations which are Behrang, Slim River, and Kampar and Tapah Road. Moreover, the Ipoh team is responsible for all the remaining stations. However, doing all the maintenance work in-house is not the best option for the maintenance department. By doing this, the maintenance

department is limited to only 2 -3 request per day as this is a very low number for maintenance work. Thus, it will reduce the standard of maintenance at KTMB stations.

Conducting in-house maintenance does, however, have some advantages such as cost reduction, better control of staff and more flexibility in conducting maintenance activity. However, going fully in-house by having a limited number of employees to carry out maintenance tasks is not practical to maintain 11 stations.

4.4.5 Convenient Access for Maintenance Work

One of the main issues that the maintenance department faces is convenient access for some maintenance work. During the designing and building of the structure, the maintainability of the building components was not considered, hence leading to difficult access to certain parts of building to carry out maintenance work. Access for maintenance tasks is a critical factor that the designers should consider during design and construction of the structure.

In all of the new stations, access to the top of the roof for clearing roof gutter as well as maintaining galvanized water pipe that is inside the wall is the most difficult part of the building to maintain. When there is leakage in the roof, the maintenance department will inspect the roof top to ensure the roof gutter is not blocked by dirt and debris. The only way to access the roof top to inspect the roof component is by using a long ladder or mobile crane at the side of the building. Maintaining the rooftop is one of the risky maintenance task that the management team has to handle.

4.4.6 Low Maintenance Standard

As it was discussed earlier, the KTMB stations do not comply with the proper standard for maintenance of a structure. A well-maintained structure should be free from structural defects, stains and dirt on the wall and floor and all the building equipment should be in good condition. However, there are factors that affect the maintenance standard of the structure, such as:

- Insufficient budget allocation
- Lack of manpower
- Unrealistic procurement method which focuses solely on in-house maintenance
- Lack of maintenance consideration during the design stage.
- Focus most of the maintenance activities on corrective maintenance

The KTMB stations conduct maintenance activities based on the request that receives from stations master. When there is something broken the request will be sent to the maintenance department to address the issue. However, this will lead to the existence of lots of defects in the structure. When the building component is repaired when its broken, then there will be accumulations of defects, and since it is not broken, it is not going to be fixed.

4.4.6.1 Station's Defects

During a visit to few of the KTMB stations, poor maintenance of the structure is visible by eyes and it can be seen that the most of the KTMB stations are not well-maintained. Table 4.6 shows the currently existed defects with a brief description.

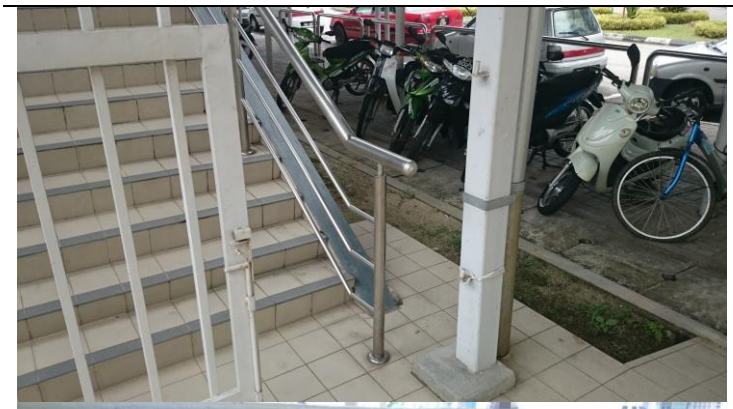
Defects Picture	description
	The Broken gate that was sent for repair and it was not fixed for few months. (Kampar Station)
	The poor condition of wall paint in waiting area gives the station an old look to the stations where the stations are only built for 9 years, and it is not appealing to passengers. (Kampar station)

Figure 4.3 – Station Defects

The Broken seat is being temporary fixed and supported by wooden plank to keep the seat from bending down. This is clearly indicating poor maintenance standard of the stations. (Kampar station)

Unfixed speaker for an emergency in the male bathroom. (Batu Gajah Stations)

Broken Tiles at the entrance of the stations (Batu Gajah Station)

Figure 4.3 (Cont.) – Station Defects

Termites are slowly eating through the door frame in male toilet. (Tapah Road Station)

The bucket is collecting leaking water from toilet sink instead of fixing the broken pipe. (Tapah Road Station)

Drainage is being covered by dirt, and the insufficient space for the water to pass will cause water accumulation during the rain (Tapah Road Stations)

Figure 4.3 (Cont.) – Station Defects

4.5 Good Maintenance Practices

Other than all the issues and critics and the poor standard of maintenance work that exist in the maintenance department of KTMB stations, there still some good practices exist that worth mentioning. Practices such as regular inspection, safety briefing, and good response time for emergency maintenance are some of the good practices that the department of facility management carries out.

4.5.1 Regular Inspection

Regular inspection of the entire building component is done by the acting technician once every two months to ensure that the building is fit for its function. However, as it was mention previously due to the low standard or maintenance activity, many of the tasks such as cleanness of walls and floor from stain and some components that need to be replaced but still functioning will be neglected during the inspection.

4.5.2 Safety Briefing

Another good practice that is done by the maintenance department is that during every maintenance task, the handyman will brief all the maintenance worker regarding the safety procedure in the stations. Some part of the building that has high power voltage should be avoided during the maintenance work, and the safety briefing will include all the procedure to undertake to minimize the risk.

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.1 Introduction

In the previous chapters, the issues in maintenance of the KTMB stations was discussed, and the data that was collected during the interview was analyzed. Now that the problem is known in the maintenance of the KMTB stations, conclusion and recommendation can be drawn from those results. As a facility manager, maintaining KTMB stations with all the limitations that he faces such as budget and lack of manpower is not an easy task to be performed. However, some of the issues can be easily avoided and by managing the resources and the KTMB maintenance department can increase the standard of their station.

Some limitations such as the poor method of budget allocation, unrealistic procurement methods that are not under the control of the maintenance department, can still be improved by giving suggestion to the related party. The main goal of the maintenance department is to reduce the cost of maintenance. However, if the stations are well maintained, there is a chance for the KTMB management team to earn extra money by attracting more passengers. According to research that was conducted in Britain railways station, after the renovation and major repair in and making the stations look more appealing, the number of travelers increased over the time.

5.2 Recommendation

During the data analysis of the maintenance practices in Malaysia's railway stations, many issues were identified and some those issues such as procurement method and lack of manpower leads to a poor standard of maintenance tasks in KTMB stations. For the facility manager to overcome some of these issues, some changes must take place to achieve a better result from maintenance work and to be able to improve the standard of the maintenance in the stations.

5.2.1 Alternative Method of Budget Allocations

The KTMB Maintenance Department estimates the cost of maintenance work from the previous year and uses it as a model for the next year. This is an acceptable method to allocate budget for maintenance. However, this approach does have many flaws such as inaccurate estimation of the budget due to major maintenance task for the previous year and delay for allocation of budgets that are out of scope.

To solve the delay in receiving maintenance budget for the task that are out of scope, the maintenance department should set aside contingency budget for these types of task. Contingency maintenance budget could be carried forward if it was not used for any contingency task and it should not be used for any other maintenance task such as routine maintenance or regular inspection. The basic rule of budget allocation in every activity is always to set aside contingency amount to avoid further delay for the tasks that are outside scope of the budget.

The recommended method of budget allocation is to use periodical inspection budget allocation. In the periodical inspection, the budget is allocated based on the recent inspection that was done in the building. The inspection is often done every two months to ensure the quality and condition of the building. By using this method, the maintenance department can receive more budget for the stations that are in poor conditions and require more budget than the others. This approach has been used for

cost estimating of building element and it is used for estimating the maintenance cost of buildings with poor condition.

5.2.2 Overcome Issues in Maintenance Practices

One of the main issues in maintenance practices that are carried out by the KTMB maintenance department is the flow of the maintenance requests are in linear form. Each request is received and handled without considering the satisfaction of the station master as the user. This will lead to over doing work that is not done properly, and it will increase maintenance cost. To overcome this issue, the maintenance department should make their request in cycle format. If the maintenance team complete the maintenance request, the station master should be informed, and he should acknowledge his satisfaction before the case can be closed.

5.2.3 Increase Number of Employee in Maintenance Department

The maintenance department only has 12 maintenance workers who are conducting maintenance work. The other three staffs are under management team who arrange budgeting and regular inspection. For 11 stations, one driver and 11 maintenance staff are definitely not sufficient. One of the reasons that the standard of the maintenance condition of the structure is reduced is due to the lack of maintenance worker. The maintenance department has to consider the amount of available staff they have when managing multiple requests and to manage all request on time, some activities will have the poor performance to reduce maintenance time so the team can handle other maintenance works.

Lack of manpower is one of the important issues that needs to be addressed since it has a direct impact on the performance of maintenance activities as well the standard of maintenance work done by the maintenance department. Based on the organizational chart, the department of facility management in Ipoh KTMB stations

have five vacant positions available for maintenance handyman, and the advertisement has been set up to increase the number of a maintenance worker and handyman. However, until now there are very few people who are interested in working in this field. This is one of the dilemmas that the facility manager faces while maintaining all the 11 stations.

5.2.4 Practical and Realistic Procurement Method

All the maintenance activities are based on the in-house maintenance team. Every task is done by the maintenance team located at Ipoh facility management department. Despite the advantages of in-house maintenance such as flexibility in training staff and lower cost of procurement, still going full in-house for all the maintenance work will lead to a lack of manpower, and this will lead to lower quality of the maintenance work hence, the standard of maintenance work in the stations will be reduced. In order to come up with the practical procurement method, the budget allocated for the maintenance department should be increased in order to hire more outsourced contractor to conduct certain maintenance activities.

By outsourcing some of the maintenance activity, the maintenance department can replace some of the in-house staff with outsourced contractor, and this could work as contingency staff when the maintenance department is overwhelmed by the maintenance request.

5.2.5 Improve Maintenance Standard of Stations

As it was discussed earlier, the standard of maintenance work in the station is not based on one factor; rather there are few factors such as lack of manpower, procurement method and the quality and choice of material have a direct impact on the standard of maintenance work in the stations. by replacing the unsuitable material and outsourcing some of the maintenance activities, the pressure from in-house

maintenance team could be reduced hence the quality of the maintenance work could be improved since the maintenance team has more time and more manpower to conduct and finish the maintenance work.

Other than that by allocating budget based on periodical inspection and the current condition of the structure, the maintenance department can have enough fund for certain stations that are not in the good condition. If the budget is allocated based on the condition of the structure, the long process of budget claim could be reduced. This would benefit the facility managers as they can conduct more repair and replacement work for the materials that need to be changed but it was withheld due to the budget constraints.

5.3 Conclusion

One of the main issues that the facility manager faces is an improper allocation of budget. The method that is currently used is based on the previous maintenance cost of the building and the cost of maintenance will be estimated based on the maintenance cost of previous year without considering the recent condition of the building. The demerit of this method is the inaccurate release of the budget for certain stations that need more attention due to the condition of the structure.

Lack of standard imposed by the facility management in maintaining tasks is also another issue that needs to be addressed. According to this research factors that leads to lower standard of maintenance work are:

- Improper budget allocation
- Lack of manpower
- Unrealistic procurement method which focuses solely on in-house maintenance
- Lack of maintenance consideration during the design stage.
- Focus most of the maintenance activities on corrective maintenance

Some of these factors such as lack of manpower and lack of consideration for maintenance during design stage are not in the control of the facility manager. However, improper allocation of budget and conducting more routine maintenance rather than fully focusing on corrective maintenance can reduce the number of defective items in the station. Hence, it will increase the standard of the structure.

One of the leading causes of increase in maintenance cost in KTMB stations was the choice of material with low quality and also unsuitable material for the use in the train station. These wrong choices in the material led to the breakdown of the material sooner than expected life cycle of the material. In order to ensure that the materials are suitable for the railway station, during the design stage, the life expectancy of materials such as galvanized pipe, water tap, and aluminum seats must be examined and must make sure that they are compatible with the usage of the structure.

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APPENDICES

Case Study Interview in English
Date: 9th March 2016
Duration: 2 hours

1. What is your name and position in maintenance department?
2. How many stations do you manage and what are the sizes of each station?
3. What is the distance between your first stations until the last station you manage?
4. What is the type of structure of all the stations and their age?
5. How to do categorize the overall conditions of the new stations?
6. Does the design of the building have impact on maintaining the station?
7. Does the new design of the stations affect the maintainability of the building?
8. Do you have safe maintenance access to different part of station structure?
9. What are the maintenance services that you do?
10. How often you receive maintenance request?
11. Do you have regular inspection for preventive maintenance? If yes
12. How often is the regular inspection?
13. How often are the cleaning services done?
14. How often is the emergency maintenance?
15. What type of maintenance practices is done by the maintenance department?
    -corrective? Preventive?
16. How many full time staff for all the stations in maintenance department?
17. How many maintenance departments do you have along the way? How many staff in each?
18. How long is their experience in working at maintenance department?
19. How many maintenance request can you execute per day?
20. If you receive more maintenance request than you can execute, how do you manage?
21. Do you have lack of man power?

22. How is the procurement of your maintenance?
    -Full outsourcing (how many %)
    -selective outsourcing and in house services
    -in-house services (how many %)
23. How do you distribute in house and outsources services? Who does what?
24. How often you receive the funding? Monthly? Quarterly? Yearly?
25. How is the budget distributed among the stations?
26. Which maintenance task required the most budget?
27. If the maintenance is out of budget how do you request and to whom?
28. How long would it take for the fund outside budget to be received?
29. Is there budget constrain for regular maintenance?
30. Factors affecting maintenance cost 1 highest 5 lowest
    -Age of the structure
    -size and area of the structure
    -type of the structure
    -faulty design
    -Safety and health requirement.
    -Requests from the station master
    -Building condition
    -poor workmanship
    -Receive complain regarding maintenance
    -building material
    -type of finishes
    -Availability of the funding
    -Third party vandalism
    -Poor or lack of training of station staff
    -budget constrain
    -poor maintenance tracking
    -delay and failure reporting maintenance problem

31. Which part of the station is the most difficult part to inspect?
32. Which part of the station is the most difficult part to clean? Is it due to lack of maintenance consideration due to the design of the structure?
33. Which part of the station is the most difficult part to repair and replace?

34. Which part of the building you maintain most often? (Other than cleaning services)
35. Which month of the year you receive most request? Why?

36. Rank your priority from 1 most important to 3 least important
    -shortest waiting time
    -as few man power as possible
    -the least budget to spend.
37. Did you observe difference in maintenance cost, budget and maintainability of the structure after the renovations of the stations?
38. Is the new design more maintainable than the old design if the age of the building is not the factor?
39. Do you require more man power over the course of past 5 years up until now?
40. How often do you have formal meeting with the stations masters regarding the maintenance planning and issues?
41. When do you replace building component? At the end of the manufacture recommended life? Or after it's broken?
42. What is the flow chart of one service request?
43. Could you provide details of all maintenance services done in one month?

Case Study Interview in Bahasa Malay

- What is your name and position in maintenance department?
  Boleh encik beritahu saya nama penuh encik dan jawatan encik di Jabatan Penyelenggaraan?
  - How many stations do you manage and what are the sizes of each station?
  Berapakah bilangan stesen yang perlu encik uruskan dan agaknya apakah saiz bagi setiap stesen tersebut?
- What is the distance between your first stations until the last station you manage?
  Apakah jarak di antara stesen pertama dan stesen terakhir yang encik uruskan?
- What is the type of structure of all the stations and their age?
  Apakah jenis struktur semua stesen ini dan sudah berapa tahunkah stesen-stesen ini wujud?
- How to do categorize the overall conditions of the new stations?
  Bagaimanakah encik mengkategorikan keadaan stesen-stesen baru tersebut pada keseluruhannya?
    - Does the design of the building have impact on maintaining the station?
  Adakah reka bentuk bangunan mempunyai impak terhadap penyelenggaraan stesen?
- Does the new design of the stations effects the maintainability of the building?
  Adakah reka bentuk baru stesen memberi kesan kepada penyelenggaraan bangunan?
- Do you have safe maintenance access to different part of station structure?
  Adakah encik mempunyai akses penyelenggaraan yang selamat untuk pelbagai bahagian yang berbeza dari segi struktur stesen?
- What are the maintenance services that you do?
  Apakah servis penyelenggaraan yang encik buat?
- How often you receive maintenance request?
  Berapa kerapkah encik menerima permintaan untuk penyelenggaraan?
- Do you have regular inspection for preventive maintenance? If yes

Adakah encik kerap menjalankan pemeriksaan untuk penyelenggaraan pencegahan? Jika ya

- How often is the regular inspection?
  Berapa kerapkah pemeriksaan tersebut?

- How often are the cleaning services done?
  Berapa kerapkah perkhidmatan pembersihan dibuat?
  - How often is the emergency maintenance?
    Berapa kerapkah penyelenggaraan ~~untuk~~ kecemasan dibuat?
  - What type of maintenance practices is done by the maintenance department?
    -corrective? Preventive?
    Apakah jenis penyelenggaraan yang diamalkan oleh di Jabatan Penyelenggaraan? – Pembetulan? Pencegahan?
  - How many full time staff for all the stations in maintenance department?
    Berapakah jumlah kakitangan sepenuh masa untuk semua stesen di Jabatan Penyelenggaraan?
  - How many maintenance departments do you have along the way? How many staff in each?
    Sepanjang jalan ini, terdapat berapa banyak Jabatan Penyelenggaraan? Berapakah jumlah kakitangan di setiap jabatan?
  - How long is their experience in working at maintenance department?
    Berapa lamakah pengalaman mereka bekerja di Jabatan Penyelenggaraan?
  - How many maintenance request can you execute per day?
    Berapa banyakkah permintaan penyelenggaraan yang dapat encik laksanakan dalam satu hari?
  - If you receive more maintenance request than you can execute, how do you manage?
    Jika encik menerima permintaan penyelenggaraan yang lebih daripada yang boleh dilaksanakan, bagaimanakah encik menguruskan situasi ini?
  - Do you have lack of man power?
    Adakah encik mengalami kekurangan tenaga pekerja?

  - How is the procurement of your maintenance?
    -Full outsourcing (how many %)
    -selective outsourcing and in house services

-in-house services (how many %)

Bolehkah encik beritahu bagaimanakah pembahagian atau perolehan untuk penyelenggaraan?

- Sumber luaran sepenuhnya (berapa peratus)
- Sumber luaran terpilih dan perkhidmatan dalaman
- Perkhidmatan dalaman (berapa peratus)

- How do you distribute in house and outsources services? Who does what?
  Bagaimanakah encik mengagihkan perkhidmatan dalaman dan luar? Siapakah yang akan melakukan perkhidmatan dalaman dan luar?
- How often you receive the funding? Monthly? Quarterly? Yearly?
  Berapa kerap encik menerima pembiayaan? Setiap bulan? Setiap suku tahun? Setiap tahun?
- How is the budget distributed among the stations?
  Bagaimanakah pengagihan bajet dibuat di antara stesen-stesen tersebut?
- Which maintenance task required the most budget?
  Apakah tugas penyelenggaraan yang memerlukan bajet yang paling tinggi?
- If the maintenance is out of budget how do you request and to whom?
  Sekiranya kos penyelenggaraan melebihi bajet, bagaimanakah encik akan membuat permintaan dan kepada siapakah permintaan ini ditujukan?
- How long would it take for the fund outside budget to be received?
  Berapa lama masa yang akan diambil untuk pembiayaan daripada pihak luar diterima? Berapa lamakah masa yang diperlukan untuk menerima dana di luar bajet?
- Is there budget constrain for regular maintenance?
  Adakah terdapat kekangan bajet untuk penyelenggaraan kerap?
- Factors affecting maintenance cost 1 highest 5 lowest
  (Faktor-faktor yang memberi kesan kepada kos penyelenggaraan) 1 tertinggi 5 terendah
  -Age of the structure
  (Umur struktur)
  -size and area of the structure
  (Saiz dan keluasan struktur)
  -type of the structure
  (Jenis struktur)

-faulty design
(Kesilapan dalam reka bentuk)
-Safety and health requirement
(Keperluan dari segi keselamatan dan kesihatan)
-Requests from the station master
(Permintaan daripada ketua stesen)
-Building condition
(Keadaan bangunan)
-poor workmanship
(Mutu kerja yang kurang memuaskan)
-Receive complain regarding maintenance
(Menerima aduan mengenai penyelenggaraan)
-building material
(Bahan mentah bangunan)
-type of finishes
(Jenis pengakhiran)
-Availability of the funding
(Dana yang sedia ada)
-Third party vandalism
(Vandalisme daripada pihak ketiga)
-Poor or lack of training of station staff
(Kekurangan program latihan kepada kakitangan stesen atau kurang memuaskan)
-budget constrain
(Kekangan bajet)
-poor maintenance tracking
(Pengesanan penyelenggaraan yang kurang memuaskan)
-delay and failure reporting maintenance problem
(Penangguhan dan kegagalan untuk melaporkan masalah penyelenggaraan)

- Which part of the station is the most difficult part to inspect?
  Di stesen, bahagian manakah yang paling susah untuk diperiksa?
- Which part of the station is the most difficult part to clean? Is it due to lack of maintenance consideration due to the design of the structure?

Bahagian stesen manakah yang paling susah untuk dibersihkan? Adakah ini disebabkan pengabaian dalam pertimbangan penyelenggaraan kerana reka bentuk struktur?

- Which part of the station is the most difficult part to repair and replace?
  Bahagian manakah di dalam stesen yang paling susah untuk dibaiki dan digantikan?
- Which part of the building you maintain most often? (Other than cleaning services)
  Dalam bangunan, bahagian manakah yang encik perlu selenggara paling kerap? (selain daripada perkhidmatan pembersihan)
- Which month of the year you receive most request? Why?
  Pada bulan berapa biasanya encik menerima permintaan yang paling banyak? Kenapa?

- Rank your priority from 1 most important to 3 least important
  Tetapkan keutamaan anda (daripada 1 paling penting ke 3 kurang penting)
  -shortest waiting time
  (masa menunggu yang tersingkat)
  -as few man power as possible
  (tenaga kerja yang paling minimum)
  -the least budget to spend
  (Bajet paling minima untuk dibelanjakan)
- Did you observe difference in maintenance cost, budget and maintainability of the structure after the renovations of the stations?
  Adakah terdapat perbezaan dalam kos penyelenggaraan, bajet dan struktur penyelenggaraan selepas pengubahsuaian stesen-stesen ini?
- Is the new design more maintainable than the old design if the age of the building is not the factor?
  Adakah reka bentuk baru ini lebih senang untuk diselenggara berbanding dengan reka bentuk yang lama jika factor umur bangunan tidak diambil kira?
- Do you require more man power over the course of past 5 year up until now?
  Adakah encik memerlukan tenaga pekerja yang lebih banyak sepanjang 5 tahun yang lepas sehingga sekarang?

- How often do you have formal meeting with the stations masters regarding the maintenance planning and issues?

  Berapa kerapkah encik mengadakan mesyuarat rasmi dengan ketua-ketua stesen mengenai perancangan penyelenggaraan dan isu-isu yang berkaitan?
- When do you replace building component? At the end of the manufacture recommended life? Or after it's broken?

  Bilakah encik akan menggantikan komponen bangunan? Pada akhir jangka hayat yang dicadangkan oleh pengeluar atau selepas ianya rosak?
- What is the flow chart of one service request?

  Apakah carta aliran untuk meminta satu perkhidmatan?
- Could you provide details of all maintenance services done in one month?

  Bolehkah encik memberi saya semua butir-butir perkhidmatan penyelenggaraan yang telah dibuat dalam satu bulan?