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# IDENTIFY HOSTEL MAINTENANCE MANAGEMENT PROBLEMS, ESPECIALLY IN INCOMPLETE DATA USING A SNAPSHOT MODEL

(Case study in International College Yayasan Malacca (ICYM))

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## ABSTRACT

Islamic University hostel maintenance management is essential to prolong the building life cycle and reduce the company loss. When University hostel are neglected, defects can occur which may result in extensive and unavoidable damage to the building fabric or structure. The objective of this study in the International College Yayasan Malacca (ICYM) hostel Malaysia to find the maintenance problems used the snapshot techniques model is to determine the major dominant fault, cause of fault, prevention and consequence analysis. This will be done by questionnaires and distributed to all service users in ICYM hostel management student hostel. Hence, this paper is focusing on the ICYM management used snapshot model is to identify and determine the major dominant fault, cause of fault, prevention and consequence analysis which the aim is to reduce the downtime of plant items taking into account the possible impact of a failure in terms of cost. The analysis shows that the hostel building contributed to the most problematic area in ICYM hostel based on snapshot model is a kind of hierarchical analysis where all possible failures are classified into different levels and conclude the major dominant fault, cause of fault, prevention and consequence analysis.

***Keywords:*** Snapshot Model; Defect and Failure

## 1.0 INTRODUCTION

Snapshot model is a kind of hierarchical analysis where all possible failures are classified into different levels. The snapshot model is to identify and determine the major dominant fault, cause of fault, prevention and consequence analysis. The type of data required to conduct snapshot analysis include type or area of faults/ failures, causes of the faults/failures, consequences of faults/failures (such as downtime or cost), and possible means of preventing the occurrence of the faults (Basari, 2009 ). Snapshot model also used to identify and define the problem and identify the daily inspection maintenance problem (Onyenanu, 2010). By using the model, a suggestion to improve the inspection policy has been presented to engineers in order to reduce the downtime occurs during operations as well as the availability. It also presents some component replacement policy that might be improved. Further investigation has been conducted by Olanrewaju et al., (2010) to check the improvement when the suggestion on previous study being implemented. They indicate that the number of breakdowns during operations has reduced and the proper maintenance approach has also been implemented.

## 2.0 SNAPSHOT MODELLING PROCESS

The main process of the snapshot analysis is broken into several detail processes.The process of snapshot model (A.S.H Basari, 2009 ) passes through three major stages which are the collection of the data, the analysis of the data, and the presentation of the results to the users (maintenance engineers). The snapshot modelling requires specific type of data and information that are used in the process of maintenance problem identification. Such types of data include:

1. Cause of fault: This could be attributed to operator error, poor maintenance, wearing and ageing and others. Data of this type could be used to establish the nature of the source of the problem within the plant.
2. Consequences of fault: Data of this type may include the time lost or the downtime due to waiting for repair crews, waiting for or collecting spares, and repair itself, and also the cost incurred.
3. Prevention action: It is often possible to identify the viable means or procedures for preventing or delaying the fault or failure from recurring.

However, the data specified above are difficult to be found i.e. incomplete data in any organisation and also very tedious to be collected on a dynamic basis if the maintenance management information system is supposed to be used.

## 3.0 PROBLEM STATEMENT

The most critical component in hostel facilities maintenance in Higher Education Institutions (HEI's) is still a lack of accuracy and misleading. According to Lind et al., 2012, maintenance problem identification based on the snapshot model in the case of failure data is essential for maintenance engineers to analyse the maintenance problems. In the current snapshot model, there is an analysis of the major fault type where each component is listed with the number of faults. For instance, if a component that develops the highest number of faults is identified, it will disrupt the maintenance work of the hostel facilities and this will incur cost and downtime. Thus, ranking such a component as the most critical one is misleading. Even though the ranking is established and proper analyses are conducted, an overall ranking based on all the criteria is not considered. This could have no meaning to the users (maintenance staff) and lead to wrong decisions (Burhanuddin et al., 2015). Deeper analysis also needs to be considered to increase the accuracy of maintenance problem identification which could affect the whole building component (Swallow, 2007).

## 4.0 RESEARCH OBJECTIVES AND SCOPE

The main objectives of this research are to identify the problem of building maintenance management in ICYM and to increase the snapshot model in identifying and ranking the most critical components in hostel facilities maintenance

## 5.0 RESEARCH DESIGN

The snapshot analysis process is the major snapshot analysis module. The main process of the snapshot analysis is decomposed into several detail processes (Y.A.Wahab and A.S.H. Basari, 2014). The new detail conceptual flow diagram is given in Figure 1

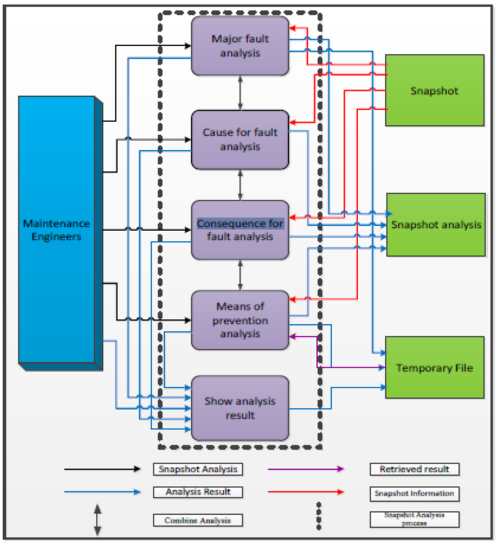


Figure 1 Details Conceptual Flow Diagram for Snapshot Analysis Process

As shown in Figure 1.1, it is recognised that the snapshot model is a collection of different types of analysis. The common types of snapshot analysis include: Major fault analysis.

1. Cause of fault analysis,
2. Consequence of fault analysis
3. Prevention action analysis.

The major fault analysis is a type of analysis that lists all the components of a UCIM with their frequencies classified as fault type which are inspection, breakdown or corrective (Y. A. Wahab and A.S.H. Basari, 2013). The analysis assumes that the component, which developed the highest frequency of fault, is the most critical and need to give more

Major fault analysis is one of the main components of snapshot analysis. By this kind of analysis, the criticality of the components of the ICYM can be assessed by looking at the frequency of the type of the faults occurred within the component (Y. A. Wahab and A.S.H. Basari, 2014 )

## 6.0 RESULT AND DISCUSSION

Major fault analysis is one of the main components of snapshot analysis. By this kind of analysis, the criticality of the components of the hostel facility maintenance is assessed by looking at the frequency of the type of the faults occurred within the component (Y. A. Wahab and A.S.H. Basari, 2016) Details of the result could be seen in Table 1 From the result, three worst components which are counted about 28.1% of the faults are Lamp, Door and window calculated about 27.5% and 21.3% came from other components.

Table 1: Total number of faults Area and Types of Faults for the period from 1 July 2012 to 30 Dec 2012 (KUIM)

| | | July | August | Sept | Oct | Nov | Dec | TOTAL FAULT | PERCENT |
|---|---|---|---|---|---|---|---|---|---|
| | Componen | Jammed | Broken | Leak | Age | Poor Desig | Other | | |
| AREA OF FAULT COMPONENT NAME/ | Lamp | 35 | 35 | 25 | 15 | 14 | 11 | 135 | 28.1 |
| | Door | 43 | 37 | 21 | 16 | 10 | 5 | 132 | 27.5 |
| | Window | 30 | 27 | | 15 | 12 | 18 | 102 | 21.3 |
| | Shower | 7 | 6 | | 7 | 10 | 4 | 34 | 7.1 |
| | Sink | 7 | 11 | | 3 | 4 | 4 | 29 | 6 |
| | Pipe | | 7 | 10 | 7 | | 3 | 27 | 5.6 |
| | Toilet | 6 | | | | 9 | 4 | 19 | 4 |
| | Bed | | 1 | | 1 | | | 2 | 0.4 |
| PERCENT | | 128 | 124 | 56 | 64 | 59 | 49 | 480 | 100% |

As shown in Figure 2 it shows the total number of fault area and the type of faults for the period from 1 July 2012 to 30 Dec 2012. The Door has the highest percentage among all of the others faults, while the lowest percentage of the number of faults are bed.

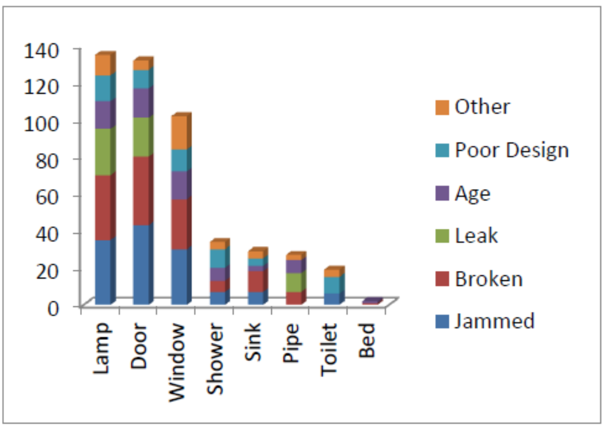


Figure 2: Total number of faults Area and Types of Faults for the Period from 1 July 2012 to 30 Dec 2012

## 6.1 Cost Analysis

The Table 2 below shows the estimated total cost of fault by area and their percentages for the causes of cost of facilities for the period from 1 July 2012 to 30 Dec 2012. The component name/area of cost including door, window, lamp, pipe, shower, sink, toilet and bed. Calculation is made according the month start with 1 July to 30 Dec 2012.

In July Period from 1 July 2012 to 30 Dec 2012, door is the highest percentage compared among all of the others faults and the other months, while the lowest percentage compared to the other entire fault is in September. Lower cost component is Toilet and bed with 1.6% and 1.1 % in HFM

Table 2: Estimated Total Cost by Area and their Percentages for the Period from 1 July 2012 to 30 Dec 2012 (KUIM)

| | | CAUSES OF COST | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | July | August | Sept | Oct | Nov | Dec | TOTAL | PERCENT |
| | Componen | Jammed | Broken | Leak | Age | Poor Desig | Other | FAULT | |
| COMPONENT NAME/ AREA OF FAULT | Door | 4300 | 1850 | 2100 | 1600 | 1000 | 500 | 11,350.00 | 32.4 |
| | Window | 3000 | 2700 | | 1500 | 1200 | 1800 | 10,200.00 | 29.2 |
| | Lamp | 1400 | 1400 | 1000 | 600 | 560 | 440 | 5,400.00 | 15.4 |
| | Pipe | | 560 | 800 | 560 | 1120 | 880 | 3,920.00 | 11.2 |
| | Shower | 350 | 300 | | 350 | 500 | 200 | 1,700.00 | 4.9 |
| | Sink | 350 | 550 | | 150 | 200 | 200 | 1,450.00 | 4.1 |
| | Toilet | 180 | | | | 270 | 120 | 570 | 1.6 |
| | Bed | | 200 | | 200 | | | 400 | 1.1 |
| Total/component | | 25.96 | 24.7 | 8.65 | 15.6 | 12.42 | 12.56 | 34,990.00 | 100% |

As shown in Figure 3, it shows the estimated total cost of faults by area and the cause of faults for the period from 1 July 2012 to 30 Dec 2012.

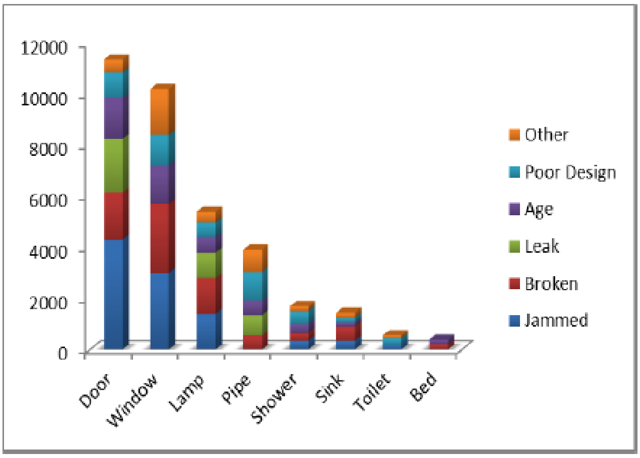


Figure 3: Estimated Total Cost by Area and Cause of Faults for the Period from 1 July 2012 to 30 Dec 2012

## 6.2 Downtime Analysis

The Table 3 below shows the estimated total downtime of fault by area and their percentages for the causes of downtime of facilities for the period from 1 July 2012 to 30 Dec 2012. The component name /area of downtime is including lamp, door, window, shower, sink, pipe, toilet and bed.

Table 3: Estimated Total Downtime by Area and their Percentages for the Period from 1 July 2012 to 30 Dec 2012 (KUIM)

| | | | DOWNTIME CALCULATION | | | | | | TOTAL | PERCEN |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | July | August | Sept | Oct | Nov | Dec | TIME | T |
| AREA OF FAULT | COMPONENT NAME/ | Door | 1035 | 881 | 504 | 382 | 222 | 120 | 3144 | 36 |
| | | Window | 720 | 648 | | 360 | 288 | 432 | 2448 | 27.4 |
| | | Lamp | 168 | 264 | | 72 | 96 | 96 | 696 | 8 |
| | | Toilet | 144 | | | | 216 | 96 | 456 | 5 |
| | | Shower | 168 | 144 | | 168 | 240 | 96 | 816 | 10 |
| | | Zinc | 150 | 110 | | 72 | 96 | 78 | 506 | 6 |
| | | Pipe | | 168 | 240 | 168 | | 72 | 648 | 7 |
| | | Bed | | 24 | | 24 | | | 48 | 0.6 |
| Percet (100 | | | 27 | 25 | 8 | 14 | 13 | 22 | 8762 | 100 |

As shown in Figure 4 it shows the estimated total downtime by area and the cause of faults for the period from 1 July 2012 to 30 Dec 2012.The Door has the highest percentage among all of the others faults followed by Window and Lamp, while the lowest percentage of the number of faults are bed.

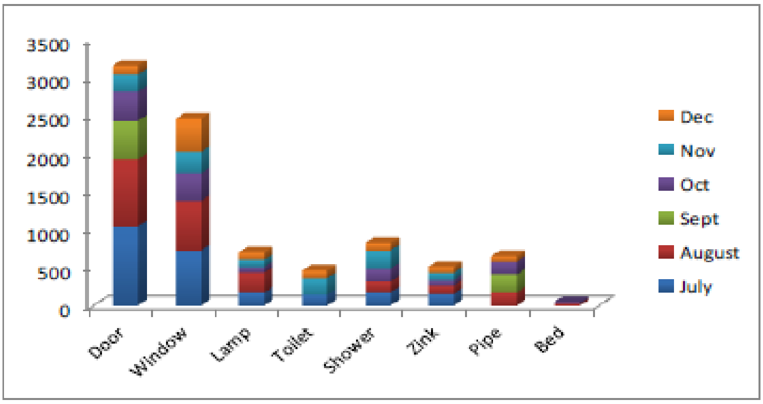


Figure 4: Estimated Total Downtime by Area and Cause of Faults for the Period from 1 July 2012 to 30 Dec 2012

### 6.3 Prevention Action Analysis

The Table 4 shows the number of faults by prevention actions and their percentage for the period from 1 July 2012 to 30 Dec 2012. The component name/area of fault including door, window, lamp, pipe, shower, sink, toilet and bed. The prevention action that it takes is a component (Redesign, detection based, a operator to failure, inspection, and also the preventive maintenance).

Table 4: Number of Faults by Prevention Actions and their Percentages for the period from July 2012 to 30 Dec 2012

| | | | Prevention Action | | | TOTAL | PERCEN |
|---|---|---|---|---|---|---|---|
| | Redesign | Detection | Operate to | Inspectio | Preventiv | FAULT | |
| Lamp | | | | | 135 | 135 | 28.1 |
| Door | 5 | 10 | 2 | 2 | 80 | 132 | 27.5 |
| Window | 10 | 5 | | 5 | 82 | 102 | 21.3 |
| Shower | | | | | 34 | 34 | 7.1 |
| Sink | | | | | 29 | 29 | 6 |
| Pipe | | | | | 27 | 27 | 5.6 |
| Toilet | 7 | | 5 | | 7 | 19 | 4 |
| Bed | 1 | | | | 1 | 2 | 0.4 |
| | | | | | Percent/Tot | 480 | 100% |

As shown in Figure 5 it shows the number of faults by prevention actions and their percentages for the period from 1 July 2012 to 30 Dec 2012. From the Figure 5.5 the lamp the higher percentage among the other components number of faults. The lowest is a bed, while the sink and pipe almost have the same percentage of preventive maintenance.

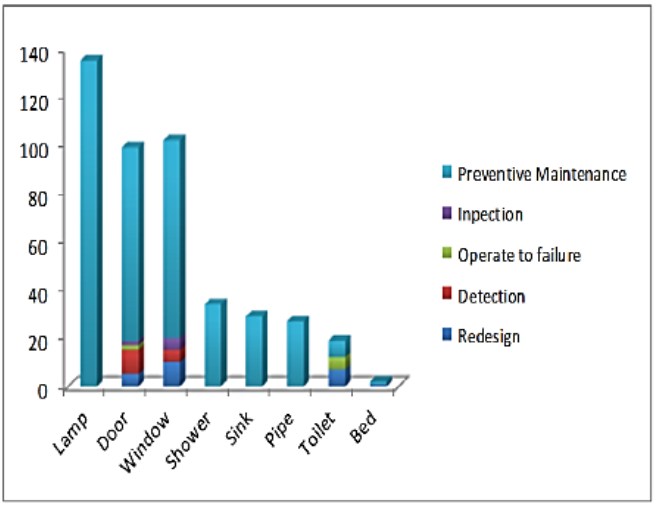


Figure 5: Numbers of Faults by Prevention Actions and their Percentages for the Period from 1 July 2012 to 30 Dec 2012

## 7.0 CONCLUSION AND DISCUSSION

The first objective is to identify the most critical component for hostel facilities maintenance by using snapshot model during identification of the actual maintenance problem. It is a model that aims to facilitate maintenance staff in developing the snapshot model for maintenance problem identification, especially when data is incomplete. Incomplete or missing data is commonly found in various areas in maintenance. The Hostel facilities maintenance has been designed, implemented and tested at the ICYM (Y. A. Wahab and A.S.H. Basari, 2015 ).The testing has been carried out based on the data collected for a semester at 1 July to 31 December 2016.

These features include the combined major fault with the fault mode, fault effect, cost and downtime analysis. Furthermore, an overall analysis which combined the fault mode in terms of the number of faults, cost, downtime and criticality analysis has also been proposed and tested (Y. A. Wahab and A.S.H. Basari, 2014). Based on the result, it is proven that the users, particularly maintenance staff, need further information by referring more features to assist them during identification and definition of the real maintenance problem.

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