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# WEAKNESSES IN THE SNAPSHOT MODEL FOR IDENTIFYING HOSTEL MAINTENANCE MANAGEMENT PROBLEMS

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**Abstract –**Management of boarding institutions of the University are important to extend the lifecycle of the building and reduce the loss of the company. When a university hostel is neglected, a defect may occur which may result in extensive and inevitable damage to the fabric of the building or structure. The objective of this study is to host a University Institution in Malaysia to find a maintenance problem that uses the snapshot model to determine the major predominant mistakes, causes of mistakes, prevention and analysis of consequences. Defects and problem faces will be collected and recorded in the check list. This will be done by questionnaire and distributed to all service users at the hostel management student hostel University Institution. Therefore, this paper focuses on the management of boarding Universities that use the snapshot model to identify and define major predominant errors, causes of errors, prevention and impact analysis that are aimed at reducing downtime of plant items by taking into account the possible effects of failure in terms of cost. Analysis shows that the Hostel building contributed to the most problematic areas in the dormitory of the Islamic University Institution based on the snapshot model is a kind of hierarchical analysis

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

## I. 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 (1). Snapshot model also used to identify and define the problem and identify the daily inspection maintenance problem (2). 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. They indicate that the number of breakdowns during operations has reduced and the proper maintenance approach has also been implemented.

## II. SNAPSHOT MODEL

This section discusses the analysis and design of the data collection module and also discusses the analysis and design of the snapshot analysis module. The main process of the snapshot analysis is broken into several detailed processes. The process of snapshot model (3) 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 types of data and information that are used in the process of maintenance problem identification (4).

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 the repair itself, and also the cost incurred (5). This data could be used in identifying the factors that constitute the downtime and the cost Prevention action: It is often possible to identify the viable means or procedures for preventing or delaying the fault or failure from recurring. Such procedures could be some form of preventive maintenance or replacement, redesigning or operator training (6).

However, the data specified above is 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. For this reason, (7) suggested the usage of a survey form for collecting such type of data on a periodic basis. The survey form will be designed with the collaboration of maintenance engineers and operational research analysts. The designed survey form then will be delivered to the maintenance engineers responsible for the repair of the hostel building component. At each failure or maintenance intervention, the engineer registers the data related to the snapshot model in a survey form (8). After obtaining a satisfactory sample of the data, an operational research analyst collects the survey form and starts the analysis process. The results of the analysis, which are either in graphical or tabular form, will then be reported back to the maintenance engineers. The results obtained are expected to reveal the true status of the hostel maintenance under the study.

## **III** **.** ANALYSIS AND PRACTICE SNAPSHOT MODEL PRACTICE (CASE STUDY - UNIVERSITY INSTITUTIONS HOSTEL IN MALAYSIA- UIHM))

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 faults that occurred within the component.

Details of the results can be seen in Table 2. From the results, the three worst components, which account for about 77% of the faults, are Lamp, Door and Window calculated at about 28.1%, 27.5% and 21.3%.

**Table 1. Total Number of Faults by Area and Types of Faults for the Period from 1 July 2015 to 30 December 2015 (KUIM)**

| | | **Jul** | **Aug** | **Sep** | **Oct** | **Nov** | **Dec** | **TOTAL FAULT** | **PERCENT** |
|---|---|---|---|---|---|---|---|---|---|
| | Component | Jammed | Broken | Leak | Age | Poor Design | Other | | |
| **COMPONENT NAME/ AREA OF FAULT** | 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%** |

Figure 1. Shows the total number of fault areas and type of faults for the period from 1 July 2015 to 30

December 2015. The Door has the highest percentage of all faults, while the lowest percentage of the number of faults was Bed.

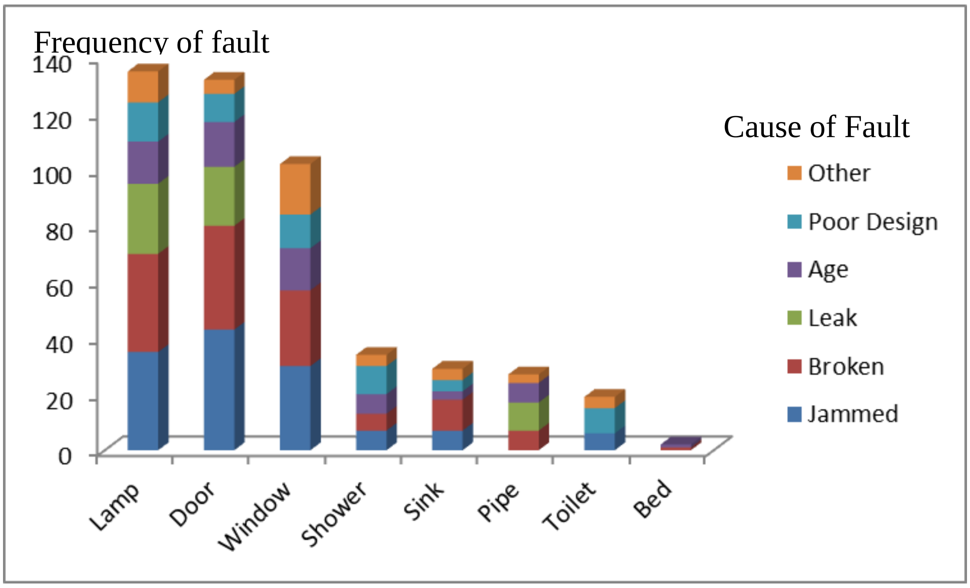


**Figure 1. Total Number of Faults by Area and Types of Faults for the Period from 1 July 2015 to 30 December 2015 (UIHM)**

IV . THE DRAWBACK OF THE CURRENT SNAPSHOT MODEL

Despite the usefulness of the snapshot model as one of the important tools for maintenance problem recognition, but the implementation of the model in large scale is doubtful (9). This is mostly due to, the scarcity and the reliability of the data i.e., incomplete data related to snapshot model, the problem of analysing the data, and the problem of interpreting the results of the analysis to the users (maintenance engineers). The expertise of operational research analysts is sought in the design of the survey form for collecting the data, supervising of the data collection, analysing of the data, and interpreting the results of the analysis to the users (10).

It is recognised the scarcity of the operational research analysts especially in the developing countries where the study is conducted. Conducting snapshot modelling on regular basis possess problems for maintenance engineers, each time they need to recall the operational research analysts to help in the analysis and interpretation of the results (11). Even with the availability of the operational research analysts, they need to spend a considerable amount of time in collecting the data, analysing the data, and interpreting the results to the users.

In the current snapshot model, there is an analysis for the major faults type where each component listed with it is number of faults. Assessing the severity of the faults in terms of the frequency of the faults in this situation sometimes is misleading. For instance, if a component that developed the highest number of faults are identified, but did not disrupt the work of the machine completely and incurred little cost and downtime (12).

Then, 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 are not considered (13). The graphical representation of the analysed data is not analysed which area are critical or not.

This could be no meaning for the users (maintenance engineers) and leads to wrong decisions. Deeper analysis also needs to be considered by looking into different angle such as combining the cost with the mode of fault as well as downtime and the criticality of the components based on the probability of failure which could affect the whole machines. A decision analysis, a decision-making process technique which could assist the users (maintenance engineers) is also not used as part of the snapshot model, which is this technique is proven helps to assist in decision. Details of the techniques Maintenance problem in Hostel maintenance can be seen in Table 2.

**Table 2. Techniques Maintenance Problem in Hostel Maintenance**

| Technique(s)/ Model(s)/ Tool(s) | Contribution | Data Collection | Advantage(s) | Disadvantage(s) | Result(s) |
|---|---|---|---|---|---|
| Snapshot model | Survey form, analysis and result | High speed canning maintenance in production line in UK | Specific for only one machines | Each failure/ fault needs a different survey form | Satisfactory |
| Snapshot model | Survey form, analysis and result | Bus fleet maintenance in Malaysia | Consider the whole bus faults/ failures | Each failure/ fault needs a different survey form | Satisfactory. More analysis has been added |
| Automated Snapshot model | Survey form, analysis and result | Optical plant maintenance in Malaysia | Easier to use because of utilizing IT to speed up the process | User interface and performance issues | Better than conventional survey form |
| Analysing IT functionality gaps for maintenance management, Kans and Ingwald (2012). | Database model for maintenance decision support | Using data from a web-based questionnaire survey conducted in Swedish industry | The gaps between required support and actual support have to be determined. | No features of decision support system | Results show that the IT systems in general provide good support for maintenance management |

## V. CRITIQUE OF SNAPSHOT CONCEPTUAL MODELS

Despite the usefulness of the snapshot model as being important for maintenance problem identification, the implementation of the model in large scale is doubtful (14). This is mostly due to the scarcity and the reliability of the data, i.e., failure data related to snapshot model, the problem of analysing the data, and the problem of interpreting the results of the analysis to the users (maintenance engineers).

In the current snapshot model, there is an analysis of the major fault type where each component is listed together with the number of faults. Severity assessment based on frequency could mislead maintenance engineers, for instance, if a component that develops the highest number of faults is identified, but did not disrupt the work of the building completely and incurred little cost and downtime, then ranking such a component as the most critical one is not accurate. Even though the ranking is established and proper analyses are conducted, an overall ranking based on all the criteria is not considered. The graphical representation of the analysed data does not analyse which area is critical or not. This could be meaningless to maintenance users (maintenance engineers) and lead to wrong decisions (15). Deeper analysis also needs to be considered by looking into different angles, such as combining the cost with the mode of fault as well as downtime and the criticality of the components based on the probability of failure which could affect the whole building. Decision analysis, a decision-making process technique which could assist the users (maintenance engineers) is also used as part of the snapshot model, which is the technique proven to help in assisting with accurate decision and ranking of the most critical component (16).

The need for an additional type of analysis in the current snapshot analysis can enhance the maintenance problem identification. The proposed approach of enhanced snapshot model is not aimed at defying the usefulness of the current snapshot model, but to complement such type of modelling (17). Enriching the various techniques that have proven appropriate and possible in combining with snapshot model could give a more effective solution with better ease of use and which could be practically applied to real world maintenance problems. Moreover, when based on the failure data, the need for enhanced snapshot is essential in order to ensure its consistency, integrity and validity (18).

## VI. CONCLUSIONS

The literature review in this study indicates that the issues in hostel facility maintenance are still a large area to be researched. Evidence shows that the Hostel Facility Maintenance area of research essentially needs modelling. The decision support is important throughout the literature since it is proven that it could improve the accuracy for the hostel facility maintenance.

However, there is still a lack of evidence to formalise a snapshot model even though these models are successfully combined and practically proven in real world situations in HFM. To date, other reliable methods to define and identify the problem such as failure mode, effect and criticality analysis (FMECA), Availability and Reliability model could possibly be integrated with the snapshot model as part of the complementary elements. The technique such as decision analysis is also essential to enrich the features of the snapshot model in order to provide an assistant to users in decision making.

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