LITERATURE REVIEW TO IDENTIFY TECHNIQUES MAINTENANCE PROBLEM IN HOSTEL MAINTENANCE FOCUS ON SNAPSHOT MODEL

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Abstract - University Institutions 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 is to University Institutions hostel in Malaysia to find the maintenance problems used the snapshot model is to determine the major dominant fault, cause of fault, prevention and consequence analysis. The defect and the problem face will be collected and noted in a check list. This will be done by questionnaires and distributed to all service users in University Institutions hostel management student hostel. Hence, this paper is focusing on the University Institutions hostel 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 Islamic University Institutions hostel based on 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 MODELING PROCESS

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 SNAPSHOTMODEL 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%.

		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%

Table 1. Total Number of Faults by Area and Types of Faults for the Period from 1 July 2012 to 30 December 2012 (KUIM)

Figure 1.Shows the total number of fault areas and the 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.

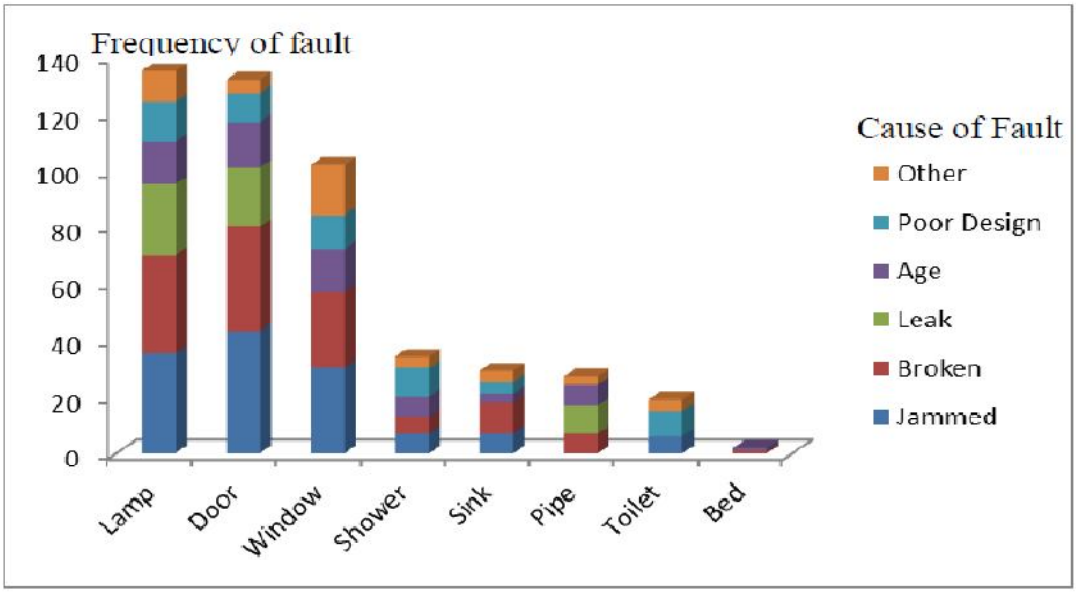


Figure 1.Total Number of Faults by Area and Types of Faults for the Period from 1 July 2015 to 30 December 2015 (UIHM)

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 are 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 are 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 are 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 need 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.

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

Table 2.Techniques Maintenance Problem in Hostel Maintenance

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).

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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REFERENCES

[1] O. A. Lateef, M. F. Khamidi, and A, Idrus, 2010. Building Maintenance management in a Malaysian university campuses : a case study. Australian Journal of Construction economics and Building, pp.77-89

[2] A.S.H. Basari, 2009. Maintenance modeling tools with special to incomplete data. PhD Thesis, UniversitiTeknikal Malaysia Melaka (UTeM), Malaysia.

[3] B. Jones, I. Jenkinson, and J. Wang, 2009. Methodology of using delay-time analysis for a manufacturing industry.Reliability Engineering and System Safety, pp.1-14.

[4] Ivan, Mustakerov, and Daniela 2013. An intelligent approach to optimal Borissova, predictive maintenance strategy defining: Innovations in Intelligent Systems and Applications (INISTA). IEEE International Symposium.

[5] Y. A. Wahab and A.S.H.Basari, "Building maintenance management preliminary finding of a case study in ICYM," Middle-East Journal of Scientific Research,vol. 17, no. 9,pp. 1260-1268, 2013.

[6] Y. A. Wahab and A.S.H.Basari, "Analysis of down time and reliability estimation in hostel building maintenance-a case study," Middle-East Journal of Scientific Research,vol. 17, no. 9,pp. 1260-1268, 2013.

[7] B. Jones, I. Jenkinson, and J.Wang, "Methodology of using delay time analysis for a manufacturing industry," Reliability Engineering & System Safety, vol. 94, no. 1, pp. 111–124, 2009.

[8] W. Wang, D. Banjevic,and M. Pecht, "A multi-component and multi-failure mode inspection model based on the delay time concept," Reliability Engineering & System Safety, vol. 95, no. 8, pp. 912–920, 2010.

[9] Y.A. Wahaband A.S..H Basari ,'Replacement Model for Higher Education Institution Hostel Building Maintenance in Malaysia'International Journal of Trade, Economics and Finance, IJTEF 2014 Vol.5(5): 449-453 ISSN: 2010-023X October 2014

[10] N.M. Sabri , A.S.H. Basari, B. Hussin, K. A. A. Samah and Y.A. Wahab, Ant Colony-Dijkstra's Algorithm for Evacuation Preparedness in High Rise Buildings, ICOCOE 2015, 9-11 Jun 2015.Phuket Thailand.

[11] Y.A. Wahaband A.S..H Basari ,'Failure Distribution of the University Hostel Building'International Journal of Engineering and Technology8.5 (May 2016): 350-353.

[12] Y.A. Wahaband A.S..H Basari ,'Best parameter of the hostel building component maintenance'nternational Journal of Computer Applications (0975 – 8887) Volume 110 – No. 15, January 2015

[13] Y.A. Wahaband A.S..H Basari ,'Identifying the best parameter distribution for university hostel building maintenance'Middle-East Journal of Scientific Research 22 (8): 1145-1149, 2014.ISSN 1990-9233 © IDOSI Publications, 2014

[14] Y.A. Wahaband A.S..H Basari ,'Replacement model for hostel building case study: ICYM' Middle-East Journal of Scientific Research 21 (11): 1977-1981, 2014 ISSN 1990-9233 © IDOSI Publications, 2014

[15] Y.A. Wahaband A.S..H Basari ,'Optimization of Downtime for Replcement Model of Hostel Facility Maintenance'Middle-East Journal of Scientific Research 23 (5): 944-947, 2015 ISSN 1990-9233 © IDOSI Publications, 2015

[16] Y AbWahab, ASH Basari, B Hussin, KAA Samah,'Three Dimensional (3D) Cost-Downtime Model for Hostel Facilities Maintenance' Advanced Computer and Communication Engineering Technology,Volume 362 of the series Lecture Notes in Electrical Engineering pp 647-657

[17] Y AbWahab, ASH Basari , "Hostel Facility Maintenance Preliminary Finding of Higher Education Institution in Malaysia", International Journal of Scientific and Research Publications-ISSN 2250-3153

[18] YuseniAbWahab, Shariffudin Amir Hashim and AbdSamad , " Optimal Replacement Model for Hostel Facility Maintenance in Malaysia ''. World Applied Sciences Journal 35 (1): 60-63, ISSN 2250-3153,2017