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Participative Mechanisms to Improve Office Maintenance Performance and Customers' Satisfaction

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ABSTRACT

Buildings can be poorly maintained due to lack of understanding towards the role of building maintenance in achieving organisation's objective and long-term profitability. The maintenance management is the agent that provides maintenance services to fulfil the needs of the organisation. However, involvement of all the key participants is the key to enhance maintenance planning, execution, and outcome. Whereby, participative mechanism involves the key participants to deal with the maintenance issues. Thus, this paper seeks to identify the participative mechanisms through literature review; then, establish relationship between the mechanisms and maintenance performance through questionnaire survey and interview; and finally produce a regression model for prediction purpose. The findings reveal that effective communication among the key participants is vital to enhance the maintenance performance. Therefore, this paper recommends that the management should develop an effective communication platform involving all key participants with contribution and commitment toward the maintenance activities.

Keywords: participative mechanism; communication; maintenance management; maintenance performance; customers' satisfaction; office building

INTRODUCTION

Building maintenance had been neglected because of the extensive costs required for maintenance programs (Lateef, 2008). As a result, failure or breakdown occurs frequently and leads to the increase of downtime. Then, downtime is likely to interrupt the daily activity of the building users. In other words, the service reliability of building services and facilities highly relates to the level of occupants' productivity and customers' comfort. Therefore, proper maintenance is vital in an organisation to achieve the organisation's objective and long-term profitability (Groote, 1995). It is necessary to have an understanding between the organisation and management so that the maintenance activities are able to guide the organisation towards meeting its objectives (Lavy & Shohet, 2007). The maintenance management is considered as a professional service agent that provides maintenance services

to fulfil the needs of the clients or organisation (Straub, 2010). Nevertheless, proper maintenance planning and execution require involvement of the key participants, including client or organisation, maintenance manager and personnel, building users and customers, as well as manufacturers and suppliers.

Participative mechanism in maintenance management is important to enable an organisation to seek additional and different viewpoints, comments, opinions, suggestions and solutions over the maintenance activities (Low & Omar, 1997; Newig et al., 2008). The participative mechanism requires the willingness of the key participants to commit and contribute in maintenance management. Low (1998) argued that the organisation and management would be benefited by accepting valuable and unexpected individual contributions. Furthermore, improvement of any project always relies on participation and involvement of all related personnel at both planning stage and implementation and feedback stages (Arca & Prado, 2008). Participation provides an opportunity to tackle problems through the engagement of the key participants, prioritising their concerns and maximising mutual satisfaction (Li et al., 2013).

Participation, individual capabilities and coordination of all the key participants have been identified as dominant factors for improving the efficiency of management (Repetti & Prelaz-Droux, 2003). In order to achieve success in maintenance management, the participative mechanism should focus on information, knowledge and skill, communication, and training among the key participants. The main purpose of the participative mechanism is to incorporate different sources of knowledge and to foster learning process (Newig et al., 2008). In addition, the mechanism also ensures continuous improvement in a project (Arca & Prado, 2008).

In cognizance of the above, this study aims to identify the participative mechanisms in maintenance management and to examine the relationship between participative mechanisms and maintenance performance based on the case study of Malaysia as shown in Figure 1. The question based on the figure is “Does maintenance management improve the maintenance performance by introducing the participative mechanism?”

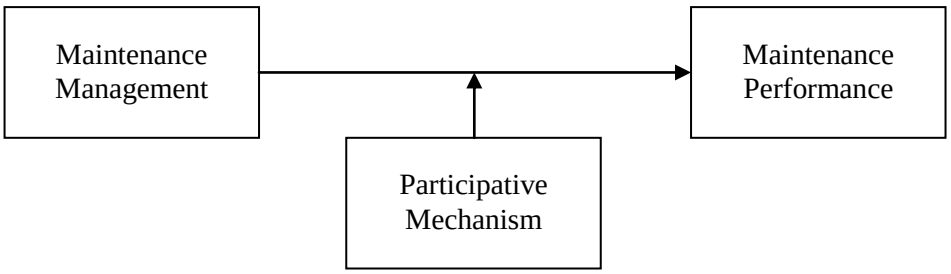

Figure 1: Relationship of participative mechanism, maintenance management, and maintenance performance

PARTICIPATIVE MECHANISMS

Participative mechanism is the mechanism that involves all the key participants in a project, from planning and implementation to review stage. Proper coordination and communication allow the key participants to express and discuss the demands, expectations, issues and problems regarding the existing maintenance program, as well as knowledge sharing (Goh et al., 2005). In addition, Lee & Scott (2009) further argued that the relationship between clients or organisations and maintenance personnel is essential and would affect the outcome of building maintenance operation processes. For example, it is vital to allow key participants to exert influence on decision making practices, so that the existing experience, skills, knowledge, and competence can be shared among the key participants (Rahmat & Ali, 2010b). Therefore, the measures for improving maintenance performance are identified as follow (Au-Yong et al., 2013):

(a) Provision of knowledge-sharing and communication platform
(b) Provision of training
(c) Clients' commitment
(d) Users' satisfaction and feedback towards maintenance management
(e) Level of care towards building and systems
(f) Manufacturers and suppliers' commitment

Provision of Knowledge-Sharing and Communication Platform

All parties such as the organisation, building users and maintenance personnel must have a universal objective of enhancing the effectiveness of maintenance actions. In order to achieve the objective, a communication platform is required to coordinate and review the actions with all parties. Whereby, proper information and knowledge-sharing management ensures efficient maintenance plan and avoids repeating mistakes (Motawa & Almarshad, 2013).

Level of communication among the key participants influences maintenance performance of a building. The maintenance performance is likely to be improved if the maintenance manager efficiently communicates with all other participants (Arditi & Nawakorawit, 1999). For instance, the maintenance manager provides a communication platform such as meeting, feedback and complaint forms to gather the participants' concerns and take action to eliminate these concerns (Bandy, 2003). Therefore, the provision of communication platform is deemed to enhance the effectiveness of the maintenance actions and result performance improvement.

Provision of Training

Training and human resources development are one of the measures recommended for improvement of maintenance performance (Groote, 1995). New techniques and technology are introduced in the building maintenance industry incessantly. As the technical complexity of the systems and the level of sophistication of monitoring and maintenance tools increases, the maintenance personnel require increased levels of maintenance training (De Silva et al., 2004; Veldman et al., 2011). For example, inspection using infrared thermography should be performed during suitable weather and radiation conditions, and the maintenance personnel must have sufficient background training to carry out the inspection accurately (Lo & Choi, 2004).

In addition, the maintenance manager should arrange the maintenance personnel to participate in various seminars, short courses, and workshops organised by related authorities to update their knowledge of maintenance techniques from time to time (De Silva et al., 2004). Training for development of multi-skilled maintenance personnel is highly needed (Hui & Tsang, 2004). Thus, a building manager should be able to devise a policy of training and development programs that helps to enhance the knowledge and skills of maintenance personnel.

Clients' Commitment

In order to ensure the maintenance strategy is parallel to the organisation's objective, the organisation or client should clearly indicate their needs and requirements toward core business. The communication between the organisation and maintenance management team helps to set agreed-upon performance goals, allocate and prioritise sufficient resources or budgets, inform the management on policy and direction changes to meet these goals, and report the performance of meeting these goals (Amaratunga & Baldry, 2002).

Clients' decisions are often the final decisions to tackle most of the maintenance issues. The maintenance manager only provides information, suggestion and advice to assist the decision making of clients. Thus, the commitment of clients towards decision making on maintenance related issues would substantially influence the maintenance process and outcome. However, most maintenance works are commonly selected on the basis of the lowest capital cost and this practice is likely to implicate the quality problems. Therefore, the clients should consider all aspects that affecting maintenance performance by using life cycle costing approach, instead of the initial cost alone (De Silva et al., 2004).

Users' Satisfaction and Feedback toward Maintenance Management

Building users' satisfaction is one of the essential building maintenance management factors, which is usually measured by the user comfort in the aspect of building service systems and facilities. It is considered as the most important factor in property management by building managers (Arditi & Nawakorawit, 1999). In addition, Myeda et al. (2011) highlighted that customers' satisfaction on the building services and facilities plays an essential role towards the core business of an organisation.

Building users can provide feedbacks and opinions to the maintenance personnel through various methods such as feedback and complaint form, post occupancy evaluation, and others. In fact, building users have the responsibility to report defects to the maintenance management team for rectification (Oladapo, 2006). For instance, informal communication such as face-to-face meeting provides additional communication, immediate feedback and hence enables the relevant remedial works to be executed. Therefore, the role of building users in evaluating the performance of maintenance services to their needs, requirements and feedbacks is significant (Myeda et al., 2011).

Level of Care towards Building and Systems

Level of care that building occupants and users give to the building and the systems would affect the conditions and needs for maintenance (Olubodun & Mole, 1999).The issue of vandalism by building occupants is one of the factors that significantly affects the maintenance need, and subsequently maintenance cost and maintenance performance (Ali et al., 2010). Abuse of buildings, especially through active or passive vandalism by the users is likely to cause unwanted damage and deterioration (Oladapo, 2006). Disgracefully, the issue of vandalism occurs because of the selfish attitude from the building occupants who perceive

that the services and facilities are not their own asset. So, they would not care about the conditions and some of them even damage the services and facilities.

Consequently, the irresponsible action and lack of commitment from the users to take care of the services affect the maintenance outcome. For instance, Kuala Lumpur City Hall (DBKL) spent RM 2.5 million mainly for repairing the defective lifts, which were mainly caused by vandalism.

Manufacturers and Suppliers' Commitment

The commitment of manufacturers and suppliers towards maintenance management is necessary. Manufacturers and suppliers need to provide complete technical documentation to the maintenance personnel. Manufacturer documentation is important to select appropriate maintenance strategies and provide diagnoses (Carnero, 2006). Furthermore, the manufacturers or suppliers may need to provide training session for the maintenance personnel so that the maintenance personnel are able to maintain the conditions of the system.

In fact, most of the maintenance personnel are ignorant about the lifetime of the system components. The lifetime stated by manufacturers is always referred, while the lifetime is based on average conditions and regular maintenance. Thus, the maintenance manuals and guidelines provided by manufacturers or suppliers will greatly assist the management in planning the maintenance programs. Maintenance and replacement under the recommendations of manufacturers are necessary at times because the conditions of a building or system components affect the operation directly and subsequent downtime is unacceptable (Arditi & Nawakorawit, 1999).

MAINTENANCE PERFORMANCE

Development of performance measurement in management aims to improve quality and service, as well as meeting cost parameters (Amaratunga & Baldry, 2002). Measurement of maintenance performance is an assessment that helps to identify the strengths and weaknesses of the maintenance activities. In addition, the result of performance measurement indicates the effectiveness of the existing strategy. Consequently, the management team is able to plan and make appropriate decision for future maintenance strategy.

The measurement of performance can be obtained through the level of success or failure in terms of schedule, cost and functionality (Sidwell, 1990). Downtime variance for building maintenance is often used in measuring the performance of buildings. It is calculated using the variance of actual maintenance downtime and planned maintenance downtime

(Rahmat & Ali, 2010a). Thus, this study chooses the downtime variance as the performance measure. However, accuracy of planned downtime reflects the credibility of maintenance performance. Therefore, it is vital for top management to identify the planned maintenance downtime at planning stage.

For the purpose of this study, a comparison between actual and planned downtime is made to identify the level of maintenance performance. For example, maintenance performance of a building system is deemed below expectation when the actual downtime for maintenance tasks exceeds the planned downtime. In contrast, high performance level is achieved when the total downtime is below the planned downtime for maintenance works.

In fact, maintenance downtime reflects the service reliability of the maintenance management. Whereby, the building occupants and organisation's customers strongly emphasises on the service reliability (Straub, 2010). So, it is assumed that the customers' satisfaction can be greatly influenced by the maintenance downtime variance.

RESEARCH METHODOLOGY

This research adopted mixed method approach that was adopted by Ali (2008) and Nik Mat (2009) to study maintenance-related topics. The approach comprises of literature review, questionnaire survey, and semi-structured interviews. This approach allows researchers to address more complicated research questions and achieve higher reliability and validity of the research (Yin, 2009). The research was divided into stages and conducted sequentially. Firstly, the participative mechanisms were identified through literature reviews and subsequently; close-ended questionnaires (see Appendix) were drafted in five-point Likert scale and multiple-choice based on the literature findings. The questionnaires were developed with reference to the research of Ali (2009). It covered three sections, namely respondent's particular, participative mechanisms, and maintenance performance (see Appendix).

Secondly, simple random sampling was adopted in the questionnaire survey to identify the relevant respondents who have been or are currently involved in office building maintenance management. This method ensures the sample accuracy by selecting the respondents at random and all elements in the population are considered (Saris & Gallhofer, 2007). Population criteria included building requirements, which were high-rise office buildings (7-storey and above, as defined under Uniform Building By-Laws 1984) located in Klang Valley, Malaysia. The sample of study was limited in Klang Valley due to large number of the high-rise office buildings located in that area. Indeed, there is no geographical

influence towards the maintenance practice in Malaysia. Meanwhile, the buildings must be completed more than two years because the maintenance requirements of new buildings are different from the older buildings. Commonly, the maintenance tasks to be implemented for a new building are less compared to old building (Nik Mat, 2009). Overall, 398 office buildings met the criteria and hence, the figure was determined as the research population. A set of the questionnaire were sent out to each building from the research population and 120 sets valid questionnaire was returned, which gave a return rate of 30 percent. The respondents were maintenance management personnel working in different office buildings. 83 percent of the respondents were building manager, building supervisor and executive specialising in the planning and execution of maintenance management activities (see Figure 2).

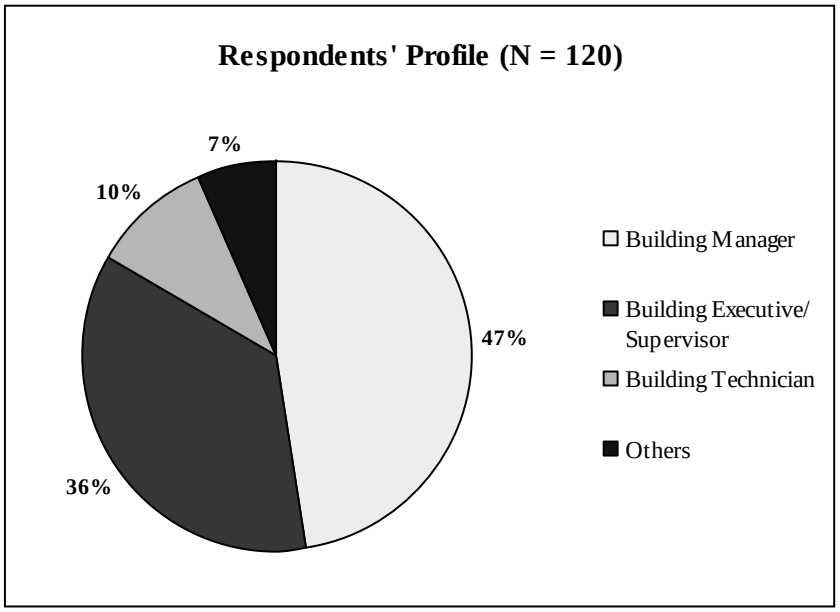

Figure 2: Respondents' profile

Reliability analysis was conducted for the participative mechanism variables to enhance reliability of the data. The purpose of this analysis was to check the consistency of the scale of data (Leech et al., 2011). The Cronbach's alpha coefficient test shows the coefficient for participative mechanisms was 0.735. Coefficient of more than 0.70 indicates good reliability.

A correlation test was used to measure the relationship between the participative mechanisms and downtime variance through Statistical Package for Social Science (SPSS) (Diamond & Jefferies, 2006). The Spearman rank-order correlation was employed for analysis. It is suitable to analyse either or both variables are ordinal (Graziano & Raulin, 2010).

Then, this study used binary logistic regression to produce the prediction model for downtime variance. Whereby, the probability of an event can be measured by using logistic regression (Chua, 2009). The dependent variables were re-coded to be dichotomous for binary logistic regression analysis. Basically, logistic regression function is as follow:

$$Z = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + ... + \beta_k X_k + \varepsilon \quad (1)$$

Where,

Z = latent variable

$X_1, X_2, ... , X_k$ = independent variables

β_0 = constant

$\beta_1, \beta_2, ... , \beta_k$ = change in Y for a change of one unit in $X_1, X_2, ... , X_k$ respectively

ε = error term

Then, Z value is transformed using a link function to obtain the probability of the event occurring. In this research, the link function to obtain the probability of downtime extension is stated below:

$$P\ [\text{downtime extension}] = e^z/1 + e^z, \text{ the value is between 0 and 1.} \quad (2)$$

In order to validate the questionnaire results, building managers with more than five years' experiences in office building maintenance were interviewed in the third stage. The interviewees were selected from the questionnaire respondents who fulfil the requirement. Semi-structured interviews were conducted to obtain further details and understandings about the participative mechanisms toward downtime variance. For example, one of the interview questions was "*Does the provision of knowledge-sharing and communication platform significantly influence the maintenance downtime variance? How it influences the downtime variance?*" The interview allows the researcher to explore and uncover the respondents' views in detail (Marshall & Rossman, 2006).

76 respondents were identified as meeting the interviewee's requirement, however, only 15 of them agreed to participate in the interview session. Apparently, the answers provided by the participants reached a saturation after twelve (12) of them were interviewed, where the answers given by the participants were similar and predictable without new information (Ali, 2008). Nevertheless, the interview session was carried on until all fifteen (15) participants were interviewed. Unlike the questionnaire survey, the interviewees were required to answer the interview questions and provide further explanation of participative mechanisms toward maintenance performance.

FINDINGS AND DISCUSSION

Relationship between Participative Mechanisms and Downtime Variance

The findings revealed the relationship between participative mechanisms and maintenance downtime variance as shown in Table 1. Basically, a correlation coefficient of less than 0.3 points to a weak relationship; a coefficient of 0.3 to 0.5 denotes a moderate relationship; and a correlation coefficient of 0.5 or more points to a strong relationship between two variables (Gray & Kinnear, 2012; Saunders et al., 2009). However, SPSS determines significantly correlated variables with the significance value of 0.05 or below. Of the six independent variables, the following four variables were identified to be significantly correlated to the maintenance downtime variance:

- Provision of knowledge-sharing and communication platform
- Provision of training
- Clients' commitment
- Users' satisfaction and feedback

Table 1: Correlation between participative mechanisms and maintenance downtime variance

Participative Mechanism	Maintenance Downtime Variance	
	Correlation Coefficient	Significance Value
Provision of Knowledge-Sharing and Communication Platform	-0.690**	0.000
Provision of Training	-0.310**	0.001
Clients' Commitment	-0.260**	0.004
Users' Satisfaction and Feedback	-0.200*	0.029
Level of Care by Users	-0.089	0.334
Manufacturers and Suppliers' Commitment	0.006	0.945

**. Correlation is significant at the 0.01 level (2-tailed)
*. Correlation is significant at the 0.05 level (2-tailed)

The result demonstrated that the provision of knowledge-sharing and communication platform was significantly correlated to the maintenance downtime variance. It supported that the proper information and knowledge-sharing management is able to enhance the efficiency of maintenance plan and to avoid unwanted maintenance delay caused by repeating mistakes (Motawa & Almarshad, 2013). By having periodical meeting among the clients, users and maintenance personnel, issues and problems related to maintenance can be discussed and resolved. For example, when the maintenance personnel detect abnormal condition of the

building system, they can bring up the issue to the client and get permission to acquire funding or material for the maintenance task in the meeting. Therefore, maintenance task can be performed on time and minimise the downtime, which include the maintenance and failure downtime. One interviewee mentioned that:

> "...regular meetings keep track of maintenance progress so that the maintenance tasks can be done on time."

Then, the Spearman's rank correlation coefficient detected significant correlation between the provision of training and maintenance downtime variance. The statement of Ali et al. (2010) and Zuashkiani et al. (2011) was confirmed, which noted that lack of training always leads to human error and lower maintenance capacity. Moreover, lack of training affects the quality of maintenance works. Errors and mistakes are likely to be made by the maintenance personnel. As a result, longer and additional maintenance time is required. One of the interviewees acknowledged the importance of training and revealed that:

> "...trainings ensure all the maintenance personnel are eligible to maintain or observe the conditions of all existing building systems, to detect and rectify defect at the right time."

In this study, the clients' commitment was found to be significantly correlated to the maintenance downtime variance. The result verified the importance of clients' commitment in allocating and prioritising sufficient resources or budgets, as well as approving the maintenance decisions (Amaratunga & Baldry, 2002). In most circumstances, clients' decisions are the final decisions to initiate most of the maintenance programs. The maintenance team always follow the instructions and decisions from clients in executing the maintenance works. Thus, the clients' commitment in giving instructions and making decisions related to the maintenance issues on a regular basis is necessary so that the maintenance team can perform their tasks at the right time. Otherwise, the severity of system deterioration may become worse. As a result, more maintenance downtime is required to restore the system back to its original state. An interviewee highlighted that:

> "...to expedite the maintenance progress, clients must give full support in approving the maintenance tasks, especially respond to the maintenance related issues and requisitions regularly."

According to the correlation analysis result, the users' satisfaction and feedback were found to be significantly correlated to the maintenance downtime variance. The findings supported Rahmat & Ali (2010a), who mentioned that informal communication such as face-to-face meeting between building users and maintenance personnel is able to provide

immediate feedback regarding to the system condition. Hence, it enables the relevant remedial works to be executed at the right time before any failure occurs. For instance, when the building users detect that the movement of the lift is not smooth and report to the management office immediately, the maintenance personnel can examine and inspect the condition of the lift instantly. Then, maintenance work can be performed if it is required to prevent system breakdown occurs. Thus, the maintenance and failure downtime can be minimised and avoided respectively. The result is confirmed by an interviewee who said that:

> "...immediate action can be taken to fix the problem that is notified by the users as they use the systems frequently and able to observe abnormal conditions instantly."

Overall findings and discussion revealed that the maintenance performance was not directly influenced by the participative mechanisms. The results demonstrated that the participative mechanisms influenced the decision-making in planning, implementation and review of the maintenance strategies and activities. Hence, the causation effects of the mechanisms towards the decision-making led to the variation of maintenance downtime. Consequently, further study about the causation effects between participative mechanisms and decision making in maintenance management is recommended.

Prediction Model of Maintenance Downtime Variance

According to the correlation analysis result, four participative mechanisms were found to be significantly correlated with maintenance downtime variance. Subsequently, logistic regression analysis for downtime extension was run using four of the significant mechanisms as its predictors. Then, the analysis would include all the significant predictors (with significant value of less than 0.05) in and exclude all the insignificant predictors (with significant value of more than 0.05) from the regression model.

In the analysis, downtime extension was coded with the value 0 and 1. Whereby, "no extension" and "extension" were labelled as 0 and 1 respectively. By using the forward stepwise method, SPSS produced one step to include the predictor that significantly contributed to the logistic regression model. As an outcome, only one independent variable significantly predicted whether or not the downtime extension occurred ($X^2 = 70.36$, $p < 0.05$).

In this case, 59.4% of the variance in downtime extension could be predicted from the provision of knowledge-sharing and communication platform (PKC). Whereby, the model predicted 81.1% and 85.1% of the cases for "no extension" and "extension" respectively. Overall, the model predicted 83.3% of the cases correctly (see Table 2). Furthermore, the p-value for Hosmer-Lemeshow goodness of fit was 0.784, which was more than 0.05. Thus, the

model adequately fit the data. Then, the logistic regression equation was produced as follows (see Table 3):

$$Z = 7.956 - 2.287\ PKC \quad (3)$$

Table 2: Classification Table[a]

			Predicted		
			Downtime Extension		Percentage
	Observed		No Extension	Extension	Correct
Step 1	Downtime Extension	No Extension	43	10	81.1
		Extension	10	57	85.1
	Overall Percentage				83.3

a. The cut value is .500

Table 3: Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	CommunicationPlatform	-2.287	0.398	32.967	1	0.000	0.102
	Constant	7.956	1.405	32.047	1	0.000	2852.325

a. Variable(s) entered on step 1: CommunicationPlatform.

The value of PKC was quantified from 1 to 5 that represented "very low degree" to "very high degree" respectively. Then, the value could be inserted to the equation in order to obtain the probability of downtime extension. Therefore, provision of knowledge-sharing and communication platform is the significant participative mechanism that affecting the probability of downtime extension. Frequent and effective provision of knowledge sharing and communication platform is likely to minimise the probability of downtime extension.

Application of the Prediction Model in Practical

In practical, the prediction model can be used to predict the probability of downtime extension. Since provision of knowledge-sharing and communication platform is the significant predictor, the criteria to be concerned about the predictor are tabulated in Table 4. Level of commitment towards the predictor can be reflected by the four criteria. Whereby, concern on the four criteria contributes to the score of 5; while none contributes to the score of 1.

Table 4: Criteria of the significant predictor to be concerned

Predictor	Criteria
Provision of knowledge-sharing and communication platform	• Regular meeting between the management and clients or organisation • Regular meeting among the management, clients or organisation, and tenants • Online feedback system • Knowledge and information sharing between the management and service providers or contractors

A case study was obtained from one of the interviewees to compare with the predication model. The management fulfilled three criteria of the predictor. Whereby, the meeting between the management and clients, as well as the meeting among the management, clients, and tenants were conducted twice in a year. Furthermore, the management set up an online feedback system for the building users to report system failure and provide opinion, suggestion, feedback or complaint at any time. As a result the management managed to prevent the downtime extension.

Then, the data of the case study was converted and computed via the prediction model. Since the management fulfilled three criteria of the predictor, it obtained the score of 4. Then, the score was inserted into the prediction model for calculation of the probability as follow:

$$Z = 7.956 - 2.287\ PKC \quad (3)$$

$$= 7.956 - 2.287\ (4)$$

$$= -1.192$$

Then,

$$\text{P [downtime extension]} = e^{z}/1 + e^{z} \quad (2)$$

$$= e^{-1.192}/1 + e^{-1.192}$$

$$= 0.233$$

According to the prediction, the management had only 23.3% of probability to experience maintenance downtime extension. The prediction matched to the exact situation of the case that no downtime extension was occurred. Additional criteria could be concerned in order to reduce the probability of downtime extension significantly. Otherwise, the organisation's productivity can be jeopardised and hence, it leads to the poor customers' satisfaction.

Since maintenance downtime affects the customers' satisfaction, the acceptable downtime must be determined from the customer to produce a maintenance benchmark. Thus, the research recommends the organisation or management to carry out customer satisfaction

survey regularly in order to identify the most suitable downtime to be allocated for maintenance purposes.

CONCLUSION

This paper emphasised the participative mechanisms to improve the maintenance downtime variance and customers' satisfaction. The reviews of the literature highlighted six participative mechanisms as significant mechanisms to be adopted in maintenance management. Then, the correlation analysis result demonstrated that four of the mechanisms are significantly correlated with the downtime variance. They are provision of knowledge-sharing and communication platform, provision of training, clients' commitment, as well as users' satisfaction and feedback towards maintenance management. Then, a prediction model generated through SPSS revealed that the provision of knowledge-sharing and communication platform is the most significant predictor of the downtime variance. In practical, the regression model would help the management to predict the maintenance performance. Furthermore, the management would be able to plan and provide the communication platform effectively in order to achieve minimal downtime. Therefore, this paper concludes that the importance of the participative mechanisms must be considered in maintenance management. Nevertheless, the involvement of key participants in maintenance management is compulsory. For example, organising meeting as a knowledge-sharing and communication platform, is the best way to involve all the key participants to discuss about the maintenance issues. Finally, this paper recommends that the management should develop an effective communication platform involving all key participants with contribution and commitment toward the maintenance activities. Furthermore, the research recommends the organisation or management to carry out customer satisfaction survey regularly in order to identify the most suitable downtime to be allocated for maintenance purposes. This helps the organisation to operate its business effectively.

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