**END USER CHARACTERISTICS IN PROMOTING MAINTENANCE CULTURE WITHIN SHARED FACILITIES**

Nor Zaimah Che-Ghani1, Nik Elyna Myeda\*2, Azlan Shah Bin Ali3

*1,2,3Faculty of Built Environment, University of Malaya, 50603, Kuala Lumpur, Malaysia.*

\*Corresponding author: elyna@um.edu.my

# Abstract

# Stratified residential building is related to shared community area where the facilities are being shared among neighborhood. Thus, it requires responsible and considerate attitude to buildings, public facilities and environment. Various problems have continued to arise in the management of stratified residential buildings due to lack of standard guidelines and professionalism which lead to low quality of service performance. One of the contributing factors in performance of maintenance services is the uncontrollable of end user characteristics. So, this paper aims to investigate the relationship of the end user characteristics and their satisfaction towards maintenance performance. To achieve the objectives of the study, a set of questionnaire surveys were distributed to the residents (end users) of stratified residential building in Klang Valley. The constructs for end user characteristics are prevention of vandalism, regulation and compliance, use and accessibility to the property, reporting and response problems and demand and expectation of end user. Whereas, the constructs for user satisfaction namely waiting time response for maintenance staff, waiting period to request repairs, worth of maintenance fee, frequency of failure, staff professionalism and overall satisfaction. Results of this study concluded that the relationship between end user characteristics and satisfaction towards maintenance performance are significant. This paper proposes that to enhance the performance of service maintenance in shared area like stratified residential building, adopting and practicing maintenance culture within end users are a stepping stone to produce effective operation and maintenance management in future.

# Keywords:

# Maintenance Performance, End User Characteristics, End User Satisfaction, Maintenance Culture, Stratified Residential Buildings

***Article history:***

Submitted: 2/11/2017; Revised: 28/11/2017; Accepted: 26/01/2018; Online: 1/06/2018

# BACKGROUND OF STUDY

# Strata living are sharing public facilities with other residents. It requires responsibility and considerate attitude of residents towards buildings, public facilities and community to make sure the surroundings is well managed and maintained. As example by Yau (2011), majority of residents in Hong Kong live in multi-storey residential buildings where they have to share the entire building structure, common areas and shared facilities. Various problems have been continued to arise in the management of stratified residential buildings due to lack of standard guideline and professionalism resulting in low quality of the service performance. For instance, poor service performance like insignificant technical condition and lack of maintenance are due to vandalism by end user (Liias, 2007). There are also many problems faced by maintenance management to operate and sustain the building because of influence of culture practices (Mohammad et al., 2014). End user behavior and way of living is influenced by their cultural background. The way of their living lifestyles like perform their duties and deal with others can differ from one culture to another (Al-Arjani, 1995). End user behavior also has been recognized as a major source of building performance uncertainty (O'Brien and Gunay, 2014). But, the main problem remains especially with the end user who is taking care of the decisions and organizing improvement and maintenance. Awareness of these circumstances should motivate all parties to make decision not only on investment in technical solutions, but also on the costs of the services to be provided (Liias, 2007).

# LITERATURE REVIEW

# *Maintenance Culture*

# Maintenance culture is not universal in nature. It is usually learned through a person making maintenance a natural daily practice that can be followed by others. It can be defined as the values, way of thinking, behavior, perception, and underlying assumptions of any person or group of the society that considers maintenance as a matter that is important and practices it in their life. This type of person or group, they intend to maintain, preserve and protect public facilities because they practice maintenance culture in daily life (Suwaibatul Islamiah et al.*,* 2012*)*. These cultures are not easy to develop because it is time consuming and occurs depending of the end user attitude (Abdullah Sani et al., 2012). Maintenance culture has been acknowledged as one of the important aspect in increasing quality of maintenance work (Sani, 2017). It should be initiated with the change of mindsets and attitudes to promote skill improvement and continuous knowledge, and improvement in performance of maintenance activities (Reiman and Oedewald, 2004). Cultural change needs to break indigenous moulds of poor perception, inappropriate behavior of the old patterns, and old-fashioned beliefs and values (Pascale and Athos, 1981). Maintenance culture is essential to improve maintenance performance which would directly lead to enhances facilities performance. It is an alternative in enhancing maintenance commitment and creating maintenance awareness among all parties involving in maintenance management (Sani et al., 2011). End user or people have various behavioral options in any given circumstances. Each of these options has a certain possibility of being enacted at any given time, reflecting current individual (motivation, habits, and resources) and contextual (cues and opportunities) factors. This possibility of enacting each behavioral response at any given time and in a given context has been termed a ‘behavioral potential’ (Rotter, 1960). These options might be intentionally or impulsively driven and may be predicated by prior behavior (Kwasnicka et al., 2016). Despite of abundant studies relating to culture especially in business and manufacturing, little effort has been put to study culture in construction industry especially in maintenance (Sani et al., 2011).

# HOW THE END USER BEHAVIOUR AFFECT PERFORMANCE

# *Prevention of vandalism*

# Vandalism is a serious problem that has been observed in high-rises residential buildings. It can be defined as a ‘wilful act of physical damage that lowers the aesthetic or economic value of an object or area’ (Campbell et al., 1968). There are two types of vandalism; 1) third party vandalism and 2) vandalism by tenants or users (Ali et al., 2010). The effects of vandalism are intended because vandals know what they are doing and still do it. They are well aware of the relation between their actions and their consequences. Also, they may be thought vandalism as a transactional process, an exchange that is consciously defined as inappropriate by society and appropriate by vandals (Christensen et al., 1992). Examples of vandalism are graffiti, broken panes, and damage to external and internal doors. Even though buildings are gated and guarded, vandalisms are still occurred in residential area (Olubodun & Mole, 1999). Kuala Lumpur City Hall (KLCH) has spends RM2.5 million solely for repairing faulty lifts and about 95 per cent are caused by vandalism (Ali et al., 2010). The most commonly affected facilities in Malaysia as reported by DBKL are lifts, electrical and mechanical equipment (Cagamas Holdings, 2013). Maintenance management should take action to reduce such problem like create awareness to the residents to protect the shared belongings in the community. Initiatives like installation of CCTV and give penalty to the defaulters can be taken by the management to reduce vandalism in residential area.

# *Regulation and compliance*

# Every building in Malaysia should have guideline in maintenance to ensure the effectiveness of the work applied. The situation of maintenance industry in Malaysia is still poor where it is still lack of standard guideline and monitoring of maintenance. Ali et al., (2010), Zawawi et al., (2010) and Myeda et al., (2011) have been agreed that Malaysia should come out with maintenance management guideline to standardise the practices in maintenance management. To increase the efficiency of strata management, Strata Management Act 2013 (Act 757) was enacted in February 2013 together with the amendments of the Strata Title Act (Act 318) during Tenth Malaysia Plan. The act will substitute the Building and Common Property (Maintenance and Management) Act, 2007 (Act 663). The aims of this act to clear all ambiguities, prevent abuses by the developer and major parcel owners, give more power enforcement powers to the authorities and create a better living environment for all. One of the improvements of this act is the establishment of a tribunal where more efficient complaint mechanisms with Strata Management Tribunal Regulation 2015 were introduced. Besides, maintenance fee and sinking fund collection methods also have been improved. The Act gives the option to resolve the dispute to the developer, Joint Management Body (JMB) and Management Corporation (MC) for the order from the Strata Management Tribunal. Commissioner of Building (COB) is authorised to issue warrants for the arrest of movable residents who still have outstanding charges (Fakhrudin et al., 2011).

# *Use and accessibility to the property*

# Reluctant of tenants in allowing maintenance staff to access their units, may make it harder to maintenance staff to check and repair the reported problems. Staff usually only get access from the external building and sometimes need additional equipment like scaffoldings to repair the defect (Ali et al., 2010). The unsecured feeling of the tenants to let maintenance staff doing their job in their units may actually delay the inspection and repairing process (Hui, 2005; Yau, 2011). All building components and elements need regular inspection, cleaning and other maintenance work to maintain their performance.

# *Reporting and Response Problems*

# Reporting problem is one of the important actions in ensuring the effectiveness of maintenance management handle on complaints issue (Blessing, 2015). Tenants should report any problems as early as possible and the managers should be response to the problems and stay ahead to the problems will have less trouble keeping. The responsiveness of the management team involves taking prompt and accurate actions in response to residents’ reports or complaints. Responsiveness is also concerned with responding to residents’ queries, the keenness of the management staff to assist the residents, and the attentiveness of the management team to inform the residents when the repair work will be carried out (Hui, 2005).

# *Demand and Expectation of End User*

# Strata living related to shared facilities and any activities and attitudes of residents can have significant impact on the satisfaction and enjoyment of others (Fakhrudin et al., 2011). However, residents are expecting and demanding more from their building nowadays and becoming less tolerant (Douglas, 1996). Residents may have insufficient knowledge about maintenance or repair works, but they still need to be assured that their building is properly maintained and in good condition. The motivation to inquire for information arises from dissatisfaction about performance and if the residents are concerned on the housing’s performance, they are likely to be involved in maintaining the building (Yau, 2011). However, closeness among residents can help to reduce conflict and crucial to expedite the maintenance process. To develop an effective maintenance system, residents and management team should work together. It is essential to have two-way communications to ensure any needed maintenance work can be done quickly and satisfy the residents (Yusof et al., 2014). Residents usually make their judgements about residential conditions based on their needs and aspirations. Zero complaints indicate the satisfaction with the performance of services and facilities (Mohit et al., 2010). Al-khatam (2003) defines the basic requirement for the user in a building is a stable shelter from the weather and suitable internal environment conditions that is non-other than housing.

# *User Satisfaction and Performance of Service Maintenance*

# Satisfaction is a subjective evaluation of the performance of products or services in meeting the needs and expectations of users or customers. It compares the benefits or value users or customers derive to that expected when a product or service is consumed (Karna, 2004). Succinctly, satisfaction is a measure of the difference between the actual and expected performance of products or services in meeting users’ needs and expectations from the users’ or consumers’ perspective during or after a consumption experience (Ibem et al., 2013). If residents are concerned on the housing performance, it means that they are likely to be involved in maintaining the building (Yau, 2011; Yusof et al., 2014). Performance can be defined as the evaluation of how good organisations being manage and the value they deliver for customer and other stakeholders. Satisfying the end user can lead sustainable value creation (Rani et al., 2015).

# RESEARCH METHODOLOGY

# Sample and data collection

# The research was conducted by distributing questionnaire survey to 194 residents in Bandar Sri Permaisuri area. The maintenance services that had to be included in the survey were determined on the basis of the literature. Only facilities and services that might have some impact on residential satisfaction were included. The facilities and services are fire control system, lift operation system, energy supply, plumbing system, water supply, sewerage system, landscaping, general cleaning, waste management, pest control, parking and security. The respondents of this survey were the residents from Lestari Apartment, Bandar Sri Permaisuri. Of the total of 194 questionnaires distributes, 52 usable questionnaires were retrieved for the final data analysis, representing a response rate of 26.8 per cent.

# *Measurement instrument and questionnaire design*

# The performance of the facilities based on time were measured based on the residents’ satisfaction on waiting period to request repairs and waiting time of response for maintenance personnel. The performance of the facilities based on cost were measured based on the residents’ satisfaction towards worthiness paid maintenance fee to the facilities provided. The quality of the facilities were measured based on the frequency of failure of the facilities and residents’ satisfaction towards the professionalism and expertise of the staff. For the questionnaire, respondents’ levels of satisfaction with the various maintenance services were measured on five-point Likert-type scale, ranging from: “extremely dissatisfied”, through dissatisfied, slightly satisfied, satisfied to extremely satisfied and also measure frequency of failure from very often, often, sometimes, rarely to never.

# *Respondent profile*

# The whole questionnaire is divided into three parts. The first part is the background information of respondents which includes group of gender, age, and occupation. Table 1 illustrates the respondent profile. It indicates 59.6% of the respondents were female, 40.4% were age 31 to 40 years and 48.1% of the respondents worked in private sector. The analysis was done using SPSS version 24. The second part of this questionnaire is about the importance of factors in evaluating the degree of performance of operation and maintenance services. This paper strictly limit on how the factors under residents characteristics evaluating the degree of performance of operation and maintenance services. The third part is the main concern of the study, measuring the performance of the facilities provided. For the questionnaire, respondents’ levels of satisfaction with the various maintenance services were measured on five-point scale, ranging from: “extremely dissatisfied”, through dissatisfied, slightly satisfied, satisfied to extremely satisfied and also measure frequency of failure from very often, often, sometimes, rarely to never.

# Table 1 Profile of the respondents

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Gender | % | Age | % | Occupation | % |
| Male | 40.4 | ≤ 20 | 3.9 | Private | 48.1 |
| Female | 59.6 | 21-30 | 32.7 | Government | 25.0 |
| *Total* | *100.0* | 31-40 | 40.4 | Self Employed | 23.1 |
|  |  | 41-50 | 13.5 | Unemployed | 3.9 |
|  |  | 51-60 | 9.6 | *Total* | *100.0* |
|  |  | *Total* | *100.0* |  |  |

# RESULTS AND DISCUSSION

# In order to statistically analyse the measurement and structural models, this study used Smart PLS software for Structural Equation Modeling (SEM) technique. In SEM, the measurement model refers to the linkages between the latent variables and their manifest variables and the structural model captures the hypothesized causal relationships among the research constructs. SEM enables the simultaneous examination of both the path (structural) and factor (measurement) models in one model. In addition to that, Smart PLS combines a factor analysis with near regressions, makes only minimal assumptions, with the goal of variance explanation (high R-square). Furthermore, Smart PLS supports both exploratory and confirmatory research, is robust to deviations for multivariate normal distributions, and is good for small sample size. Since the current study sample size is relatively small, Smart PLS was found more appropriate and befitting the purpose of the current study (Chinomona & Sandada, 2013). A measurement model of the conceptual model two latent variables was estimated. All constructs were modeled using reflective indicators. Construct reliability was assessed using Composite Reliabilities (CR) values and Cronbach’s Alpha (CA) values. As indicated in Table 2, the CR and CA values are significant for both construct.

# Table 2 Accuracy analysis statistic

|  |  |  |
| --- | --- | --- |
| ***Research Construct*** | ***Convergent validity*** | ***Internal consistency*** |
| ***Factor Loading*** | ***AVE Value*** | ***Composite Reliability (CR)*** | ***Cronbach’s Alpha (CA)*** |
| End user characteristic | *Prevention of vandalism* | 0.855 | 0.5224 | 0.8653 | 0.8664 |
| *Regulation and compliance* | 0.675 |
| *Use and accessibility of property* | 0.924 |
| *Reporting and response problems* | 0.937 |
| *Demand and expectation of users* | 0.877 |
| End user satisfaction | *Waiting time response maintenance staff* | 0.914 | 0.7268 | 0.9300 | 0.9058 |
| *Waiting period to request repairs* | 0.862 |
| *Worth maintenance fee* | 0.822 |
| *Frequency of failure* | 0.822 |
| *Staff professionalism* | 0.846 |
| *Overall satisfaction* | 0.819 |

#

# Internal consistency reliability was assessed using Composite Reliability values and Cronbach’s Alpha values. As indicated in Table 2, the composite reliability and the cronbach’s alpha value are all above 0.7. With the acceptable values, this study can conclude that the scales are reliable. Convergent validity (internal consistence) was assessed using the average variance extracted (AVE) measure and factor loading value. According to Fornell and Lacker’s (1981) the suggested benchmark should be 0.5. As can be noted in Table 2, all the item loadings and AVE values reached the recommended benchmark – implying that all items converged well on the construct they were supposed to measure and hence confirming the existence of convergent validity. To assess discriminant validity the correlation among latent variables should be less than 0.9, so that the latent variables are independent. The R2 value for the dependent variable is 0.091. This result as in Figure 1 reveal that, on the overall end user satisfaction explains about 9.1 % of end user characteristics.

#

# Figure 1 Measurement and structural model result

# CONCLUSIONS

# The purpose of this study was to investigate the influence of the end user characteristics on their satisfaction towards maintenance services performance. Important to note that the study findings is the fact that end user characteristic has influence on maintenance services performance where overall end user satisfaction explains about 9.1 % of end user characteristics.

# ACKNOWLEDGEMENT

# The authors gratefully acknowledge the financial support of the University of Malaya Research Grant (UMRG), grant no. RP015D-15SUS established at the University of Malaya, Sustainability Science Research Cluster.

**References**

Abdullah Sani, S. I., Mohammed, A. H., & Misnan, Mohd Saidin, Awang, M. (2012). Determinant Factors in Development of Maintenance Culture in Managing Public Asset and Facilities. *Procedia - Social and Behavioral Sciences*, *65*(ICIBSoS), 827–832.

Al-Arjani, A. H. (1995). Impact of cultural issues on the scheduling of housing maintenance in a Saudi Arabian urban project. *International Journal of Project Management*, *13*(6), 373-382.

Ali, A. S., Kamaruzzaman, S. N., Sulaiman, R., & Cheong Peng, Y. (2010). Factors affecting housing maintenance cost in Malaysia. *Journal of Facilities Management*, *8*(4), 285–298.

Blessing, O., Richard, J., & Emmanuel, A. (2015). Assessment of building maintenance management practices of higher education institutions in Niger State–Nigeria. *Journal of Design and Built Environment*, *15*(2).

Cagamas Holdings. (2013). *Housing the Nation: Policies, Issues and Prospects*. *Housing the Nation: Policies, Issues and Prospects*. Cagamas Holdings.

Campbell, F. L., Hendee, J. C., & Clark, R. N. (1968). Law and order in public parks. *Parks and Recreation*, *3*(12), 28-31.

Chinomona, R., & Sandada, M. (2013). Customer Satisfaction, Trust and Loyalty as Predictors of Customer Intention to Re-Purchase South African Retailing Industry. *Mediterranean Journal of Social Sciences*, *4*(14), 437–446.

Christensen, H. H., Johnson, D. R., & Brookes, M. H. (1992). Vandalism : Research , Prevention and Social Policy. *Prevention*, (November), 290.

Douglas, J. (1996). Building performance and its relevance to facilities management. *Facilities*, *14*(3/4), 23–32. https://doi.org/10.1108/02632779610112508

Fakhrudin, I. H., Suleiman, M. Z., & Talib, R. (2011). The need to implement Malaysia’s Building and Common Property Act 2007 (Act 663) in building maintenance management. *Journal of Facilities Management*, *9*(3), 170–180.

Hui, E. Y. Y. (2005). Key success factors of building management in large and dense residential estates. *Facilities*, *23*(1/2), 47–62.

Ibem, E. O., Opoko, A. P., Adeboye, A. B., & Amole, D. (2013). Performance evaluation of residential buildings in public housing estates in Ogun State, Nigeria: Users’ satisfaction perspective. *Frontiers of Architectural Research*, *2*(2), 178–190.

Kärnä, S. (2004). Analysing customer satisfaction and quality in construction–the case of public and private customers. *Nordic journal of surveying and real estate research*, *2*(67-80).

Kwasnicka, D., Dombrowski, S. U., White, M., & Sniehotta, F. (2016). Theoretical explanations for maintenance of behaviour change: a systematic review of behaviour theories. *Health Psychology Review*, *10*(3), 277–96.

Liias, R. (2007). Housing maintenance management: the key-factor when creating healthy environment. *International Journal of Environment and Pollution*, *30*(3/4), 457.

Mohammad, I. S., Zainol, N. N., Abdullah, S., Woon, N. B., & Ramli, N. A. (2014). Critical Factors that Lead to Green Building Operations and Maintenance Problems in Malaysia : A Preliminary Study. *Theoretical and Empirical Researches in Urban Management*, *9*(2), 68–86.

Mohit, M. A., Ibrahim, M., & Rashid, Y. R. (2010). Assessment of residential satisfaction in newly designed public low-cost housing in Kuala Lumpur, Malaysia. *Habitat International*, *34*(1), 18–27.

Myeda, N. E., Kamaruzzaman, S. N., & Pitt, M. (2011). Measuring the performance of office buildings maintenance management in Malaysia. *Journal of Facilities Management*, *9*(3), 181–199.

O'Brien, W., & Gunay, H. B. (2014). The contextual factors contributing to occupants' adaptive comfort behaviors in offices–A review and proposed modeling framework. *Building and Environment*, *77*, 77-87.

Olubodun, F., & Mole, T. (1999). Evaluation of defect influencing factors in public housing in the UK. *Structural Survey*, *17*(3), 170–178.

Pascale, R. T., & Athos, A. G. (1981). The art of Japanese management. *Business Horizons*, *24*(6), 83-85.

Rani, N. A. A., Baharum, M. R., Akbar, A. R. N., & Nawawi, A. H. (2015). Perception of Maintenance Management Strategy on Healthcare Facilities. *Procedia - Social and Behavioral Sciences*, *170*, 272–281.

Reiman, T., & Oedewald, P. (2004). Measuring maintenance culture and maintenance core task with CULTURE-questionnaire––a case study in the power industry. *Safety Science*, *42*(9), 859-889.

Rotter, J. B. (1960). Some implications of a social learning theory for the prediction of goal directed behavior from testing procedures. *Psychological Review*, *67*(5), 301.

Sani, S. I. A., Mohammed, A. H., Shukor, F. S. A., & Awang, M. (2011). Development of Maintenance Culture: A Conceptual Framework. In *International Conference on Management (ICM 2011)* (pp. 1007–1013). NO 33-2 Jalan 9-9c, Seksyen 9, 43650 Bandar Baru Bangi, Selangor Darul Ehsan, Malaysia.

Sani, S. I. A., Khair, N., & Mohamad, J. (2017). A Structural Model for Developing Maintenance Culture in Malaysian Local Authorities. *Environment-Behaviour Proceedings Journal*, *2*(6), 295-302.

Suwaibatul Islamiah, A. S., Abdul Hakim, M., Syazwina, F. A. S., & Eizzatul, A. S. (2012). An Overview Development Of Maintenance Culture. In *3rd International Conference On Business and Economic Research. Proceeding Conference* (pp. 2206-2217).

Yau, Y. (2011). Homeowners’ participation in management of multi‐storey residential buildings. *Property Management*, *29*(4), 345–356.

Yusof, N., Abdullah, S., & Najib, N. ‘Ulyani M. (2014). How does communication influence the perceived performance of maintenance services in multi-storey public housing? *International Journal of Strategic Property Management*, *18*(4), 380–392.

Zawawi, E. M. A., Kamaruzzaman, S. N., Ali, A. S., & Sulaiman, R. (2010). Assessment of building maintenance management in Malaysia: Resolving using a solution diagram. *Journal of Retail and Leisure Property*, *9*(4), 349–356.