

POST OCCUPANCY EVALUATION: THE NEED FOR AWARENESS AND KNOWLEDGE FOR CONTINUOUS IMPROVEMENT OF BUILDING PERFORMANCE

Izran Sarrazin Mohammad

Department of Property Management, Faculty of Geoinformation and Real Estate,
Universiti Teknologi Malaysia
Email: izran@utm.my

ABSTRACT

Today's buildings are evolving and becoming more complex. Yet, the fact that they have to conform to the user's needs remains unchanged. This leads to the upbringing of Post Occupancy Evaluation, an approach to determine the performance of buildings and their counterparts after occupancy based on the feedbacks of the occupants, and inputs from designers and managers. However, it has been argued that the practitioners in the construction industry have no interest to carry out post occupancy evaluation of building performance. This leads to the development of buildings that do not comply with the performance level expected by the occupants and clients, the repetition of similar mistakes in future building design, the inability to procure buildings with sustainable life-cycle cost, crippling the prospect for continuous improvement of building performance. Thus, this paper discusses the benefits of implementing POE, the factors that thwart the implementation of POE, and the level of awareness and knowledge of practitioners in the construction industry on POE. Two surveys conducted in the Malaysian context are discussed as examples for the issues in question.

KEY WORDS: Building Performance, User Feedback, Post Occupancy Evaluation

1. INTRODUCTION

The demand for functional, efficient, robust, environmental friendly, durable, adaptable, healthy, beautiful and comfortable buildings by today's modern society has been tremendously great. The fact that technology is rapidly advancing, businesses are becoming more competitive, people are becoming more intelligent, and the environment is degrading at an alarming rate, puts architects, engineers, builders and facility managers alike under constant pressure to produce buildings that are able to perform their best in any given condition. Indeed, today's buildings have become more complex. However, one fact still remains unchanged; the building must conform to the user's needs. With the urge for achieving sustainability and continuous improvement of building performance; the needs of building occupants have become one of the major concerns. Brooks and Viccars (2006) stated that strategies and implementation of sustainable

buildings will undoubtedly affect the internal conditions for those occupying the buildings. In return, the level of satisfaction of the occupants will determine the sustainability of the buildings and their counterparts. This leads to the upbringing of Post Occupancy Evaluation, an approach to determine the performance of buildings and their counterparts based on the perception of the occupants.

Considering the benefits that several developed countries have long achieved by practising Post Occupancy Evaluation, it is of great regret to see developing countries to possess low level of awareness and still struggling to foster the knowledge on how to systematically learn from building occupants. Much has to be learnt from those that have gained building performance improvement by using Post Occupancy Evaluation.

2. POST OCCUPANCY EVALUATION

Post Occupancy Evaluation or more affectionately known as POE is a general term used for any exercise of seeking feedback on the performance of an occupied building (Jauzens *et al.*, 2003). POE is defined as the process of systematically evaluating the extent to which a facility, once occupied for a period of time, meets the intended organisational goals and user-occupant needs (Preiser *et al.*, 1988). This method aims to study the effectiveness of designed environments from human user perspective (Zimring *et al.*, 1980, Bechtel *et al.*, 1987). Considering the definitions brought by various scholars, it can be put into generalisation that Post Occupancy Evaluation is the formal evaluation of a building that focuses on user satisfaction, measured with social science-based tools of interviews, surveys, focus groups, systematic observation, and behavioural mapping for achieving continuous performance improvement throughout the building's life cycle (Izran & Hakim, 2007).

POEs are more than mere "customer surveys"; they are absorbed in the profound building essence (Porkka *et al.*, 2004). This systematic investigation and analysis of the structure and relationships between design objectives and occupants' experiences is taken into consideration in future development efforts (Kernohan *et al.*, 1992). It should be made clear that POE does not merely consider user feedback. Building performance evaluation criteria and parameters cover various aspects that include health, safety, security, comfort, durability, aesthetics, maintenance and operations, economy, efficiency, functionality, adaptability, circulation, culture, social needs, and psychology. The evaluation of these aspects inevitably requires inputs from not only the occupants, but also the designers (architects, interior designers, engineers, etc) and the building managers (facilities managers, property managers, etc) (Izran, 2011; Becker, 1990; Gutman, 1988).

3. THE NEED FOR POST OCCUPANCY EVALUATION

The logic to implementing POE simply lies on the fact that the actual judges of the works of the architects, the engineers, the contractors, and all who are involved in the construction of a

building and its counterparts are the occupants. We may admire a building for its beauty and symbolical design, or for the technology that it possesses, or for its efficiency and effectiveness in energy use. However, if the occupants are not satisfied or having difficulties in carrying out their daily operations due to discrepancies or defects in the building, it can be fairly said that the building and its builders have failed. What might be an award-winning building may actually function quite poorly in terms of the people who use it (Sanoff, 2000).

The success of building design cannot be confirmed without post occupancy evaluation (Izran, 2011). As a mechanism to verify that the intentions of the building design have really been realised, POE systematically evaluates the opinions about buildings in use, from the perspective of the people who use and operate them, and the ones that truly understand how the finished building actually meets the specified attributes are the users. Thus, post occupancy evaluation methods are needed (Ang 1996; Preiser 1996; Margulis 1996). POE is useful to everyone who comes into contact with a building (Porkka *et al.*, 2004). Designers and facilities managers can assess how well buildings conform to users' needs, and identify ways to improve building design, and performance. Post Occupancy Evaluation can determine what works and what does not work in a built environment through the eyes of the users (Houle, 2002) and it is a powerful diagnostic tool that allows people to learn about their past, mistakes and successes alike (Preiser *et al.*, 1988). The results of a post occupancy evaluation can identify the extent to which the design intent has been met and identify best practices that can be used to improve future designs (Forbes, 2003).

The outcome of POE can be a report defining what are the strengths and the weaknesses of a building (Porkka *et al.*, 2004). The results are very useful especially in the building development and development aspect is perceived by many stakeholders; including architects, engineers, tenants, owners and consultants. Mostly POE is targeted on the occupants' point of view (Porkka *et al.*, 2004).

The purpose of this tool is simple: it helps practitioners to avoid repetitive mistakes

(Porkka *et al.*, 2004). First, it needs to have two sided opinions, both researchers and the target audience (Porkka *et al.*, 2004). Second, it improves buildings and procedures in many ways including (Porkka *et al.*, 2004):

- Reduction of the design and maintenance costs
- Increase of the customer satisfaction
- More comfort

- Better performance
- Increase of the attraction in the building
- Solve problematical issues
- Investment payback time modification.

In Jaunzens *et al.*, (2003), the Building Research Establishment (BRE) 478 has recognised the benefits of POE as shown in Table 1.

Table 1. Benefits of POE at different stages of occupancy

Stakeholder	On Occupation, or within the first 12 months of occupancy	On annual basis	Prior to move
Benefits to the clients	<ul style="list-style-type: none"> ▪ Ensures building provided matches design brief. ▪ Facilitates joint problem solving whilst the project team are still on board. ▪ Ensures building operates optimally from the outset. ▪ Ensures the impact on organisational performance is as intended 	<ul style="list-style-type: none"> ▪ Allows building performance to be maintained. ▪ Allows building performance to be benchmarked. ▪ Highlights areas where improvements could be made to reduce costs, improve environmental conditions, or modify the provision of facilities to meet changing business needs. ▪ Avoids complacency. 	<ul style="list-style-type: none"> ▪ Informs requirements for new premises. ▪ Prioritises funding allocation. ▪ Secures pre-move buy-in to planned changes, including culture changes to be facilitated by the new premises.
Benefits to the end users	<ul style="list-style-type: none"> ▪ Ensures quality of the working environment is satisfactory. ▪ Ensures the understanding of the building and able to exploit the means to control their working environment. ▪ Ensures facilities provision is suitable. 	<ul style="list-style-type: none"> ▪ Ensures continuing satisfaction with the internal environment and facilities provision. ▪ Demonstrates the commitment of an organisation to providing staffs with a suitable workplace. 	<ul style="list-style-type: none"> ▪ Allows staffs to inform the brief of subsequent premises. ▪ Allows staffs to voice their concern.
Benefits to Facilities Managers	<ul style="list-style-type: none"> ▪ Ensures they understand the building operation. ▪ Ensures they are aware of likely problem areas for subsequent monitoring. ▪ Enables them to discuss any problems with the design team. 	<ul style="list-style-type: none"> ▪ Allows the facilities team to interact positively and proactively with the end users. ▪ Allows the facilities team to prioritise their funding allocation. ▪ Allows the facilities team to demonstrate 	<ul style="list-style-type: none"> ▪ Allows the facilities team to inform the brief for subsequent premises, avoiding past deficiencies.

		the value of their own performance.	
Benefits to the project team	<ul style="list-style-type: none"> ▪ Provides immediate feedback and the opportunity to resolve problems jointly in a mutually supportive atmosphere. ▪ Is a learning experience for all staffs within the organisation. 	<ul style="list-style-type: none"> ▪ The maintenance of ongoing customer relationships. 	<ul style="list-style-type: none"> ▪ The development of a better informed brief and subsequently smoother design process.

Source: Jaunzens *et al.*, (2003), Building Research Establishment (BRE) 478

The Building Research Establishment 478 divided the benefits of POE for the four stakeholders into three time frames, namely; on occupation or within 12 months of occupancy; on annual basis; and prior to move. The summary of the benefits of POE as stated in the Building Research Establishment 478 are as follows:

- i) POE benefits all parties involved in the construction project; from the project team, the management team, the clients to the users.
- ii) POE provides the opportunity for all parties to evaluate the building almost immediately, starting from the day of its occupation.
- iii) POE promotes continuous evaluation and improvement.
- iv) POE provides the opportunity to learn from past mistakes or deficiencies and promotes performance improvement for future buildings.
- v) POE forms a complete collaboration of all the parties (project team, management team, clients and users) that leads to better understanding in the effort to build buildings that truly conform to the requirements of the users/ clients, and able to meet the changing demands of business trends.

Other building scholars have also acknowledged the benefits that POE delivers for the improvement of building performance. Preiser (2002) divided the benefits of POE into three categories:

- i) Short-term benefits
 - Identification of and solution to problems in facilities

- Proactive facility management responsive to building user values
- Improved space utilisation and feedback on building performance
- Improved attitude of building occupants through active involvement in the evaluation process
- Understanding of the performance implications of changes dictated by budget cuts
- Better informed design decision-making and understanding of the consequences of design

ii) Medium-term benefits

- Built-in capacity for facility adaptation to organisational change and growth over time, including recycling of facilities into new uses
- Significant cost savings in the building process and throughout the life cycle of a building
- Accountability for building performance by design professional and owners

iii) Long-term benefits

- Long-term improvements in building performance
- Improvement of design databases, standards, criteria, and guidance literature
- Improved measurement of building performance through quantification

4. DIFFICULTIES CONFRONTING POE

Subsequent to the completion of a building, designers, contractors and developers proceed to the next project. The occupants on the other

hand occupy the building and begin to discover the defects, problems and discrepancies that the building renders. After years of occupying the building, the accumulative problems become more apparent, forcing the management to undertake modifications and draw up maintenance strategies to ensure the building is able to sustain the demands of their operation. This is a typical scenario that all building occupants are confronted with.

Unlike the other industrial sectors, the construction industry has been slow at learning from what it has delivered to its users. Much has been said about how learning from building occupants should be an integral part of the building construction process. However, in practice, learning from building occupants for continuous improvement of building performance is still regrettably rare. Way and Bordass (2005) acknowledged the fact that the construction industry has been slow to learn from buildings in use because it does not get close to its user and clients. However, the awareness among builders to learn how their buildings are performing from the perspective of the users has been gaining popularity over the past 50 years. Various countries all over the world have taken the effort to improve building performance by carrying out user satisfaction studies on completed buildings. Post Occupancy Evaluation or better known as POE is the most widely used mechanism to audit user feedbacks in the effort to continuously improve building performance.

Post Occupancy Evaluation (POE) has been practiced in many nations for more than 50 years. Stories of building performance improvements and escalating user satisfactions echo wherever this simple yet effective approach is practised. Surprisingly, although POE has been long practised elsewhere, its application in Malaysia is almost unheard of (Izran, Hakim, Shardy, 2007).

The absence of a building performance appraisal system that incorporates user feedbacks is one of the reasons why we lack essential information on how our buildings are performing. Hakim (2007) stated during the National Asset and Facilities Management convention (NAFAM 2007) that the absence of such information causes the same mistakes to be repeated.

Similarly, Pillay (2007) stated that past mistakes that are done in our buildings are not documented. In her study of playgrounds, Lady Allen of Hurtwood (1969) once asked:

Why [are] so many expensive mistakes...made over and over again? One reason may be that there is no one to collect experience and research throughout the world, digest it, and make it readily available to architects and planners.

(Hurtwood, 1969)

Though users have been recognised as one of the major concerns in any construction project, little has been done to learn from user satisfaction that could lead to continuous improvement. Instead we are attuned to adopting the 'fire fighting habit', acting from complaints, seeking rapid action, instant solutions to immediate problems (Eley, 2001). Similarly, Malaysia adopts the same approach by discovering the weaknesses of completed buildings from complaints (Izran, Hakim, Shardy, 2007). There has been no form of a properly formatted and continuous survey.

Although there is increasing interest in building performance, the people who procure, design and construct buildings seldom engage closely with the performance of the buildings they have created (Bordass & Leaman, 2005). From the point where the building is handed over to the occupants, it has been accepted as almost a custom for the occupants to evaluate whether the building does or does not conform to their needs. Of course, problems will surely occur and dissatisfactions will inevitably arise which leads to complaints and followed by actions taken by the management to overcome the problems. However, it is rare for either the management or the people who developed the building to properly document and analyse the feedbacks of the users to further improve the performance of the existing building (Izran, Hakim, & Shardy, 2007). Even if such measures were undertaken, it would most likely be a one-time effort. A continuous practice of such measures is regrettably rare. This will indirectly cripple the prospect of improving the performance of future buildings based on the feedbacks obtained on existing buildings. In

other words, the experience of the users is not utilised as part of the development and continuous improvement process of buildings.

Zuriati Ashaari (2005) discovered in her Master's research project entitled "A study on the practice of POE in Facilities Management organisations in Malaysia" that:

- i) The government sector/ non-profit organisation lacks in the implementation of POE.
- ii) Full knowledge on POE has yet reached practitioners.
- iii) A large number of personnel in Facilities Management organisations in Malaysia do not know what mechanism to use to measure building/ facilities performance through user satisfaction.
- iv) There is no provision in the government's budget to evaluate user satisfaction of the facilities provided.
- v) Some organisations do not clearly know how the results of the user satisfaction study are being used to benefit the organisation.
- vi) Building/ Facilities Evaluation based on user satisfaction has only been partially implemented in the organisations in Malaysia less than 5 years.
- vii) No involvement of designers in determining what the customers need and what type of buildings or facilities that the customers are satisfied with.

5. POST OCCUPANCY EVALUATION IN MALAYSIA

Post Occupancy Evaluation is very much in its infancy in Malaysia. Despite the growing interest towards its exploration, most only involves academic research works carried out by researchers and academicians from the local public higher learning institutions. Works by Zuriati (2005), Khalil and Nawawi (2008), Saiful and Norhati (2010), and Izran (2011) are among the few academic research works carried out in the effort to explore POE.

In practice, POE has yet to gain much attention in Malaysia. Very few efforts have been heard about the undertaking of an actual POE in the Malaysian construction industry by practitioners. POE has still failed to become a part of the standard practice in building design

and management. One of the very few POE ventures that have taken place in Malaysia was the effort taken by the Ministry of Health (MOH) in 1997, in collaboration with the Medical and Health Branch of the Public Work Department (PWD), adopted from the POE methodology from various sources namely, the Medical Architecture Research Unit (MARU) UK, POE of Frankston Hospital, Australia, the University of New South Wales, Australia, Public Work Department (PWD) Australia and Malaysia and previous POE conducted by MOH (Saiful and Norhati, 2010). This collaboration team, called the Evaluation Unit has so far conducted 9 structured POE of MOH hospitals, one POE of rural health clinic and 3 private hospitals (Saiful and Norhati, 2010). According to Saiful and Norhati (2010), the results of the evaluation were used in the mid-term review of the Seventh Malaysia Plan (1997) and preparation of the Eight Malaysia Plan (2001-2005), and the last POE conducted was in 2002. Saiful and Norhati (2010) stated that the main objectives of the POE conducted by MOH then are as follows:

- i) To evaluate the capacity of the completed project to meet "project specifications" with regard to scope, quality, cost and time. The specifications are described in the project brief and master plan, and include situational analysis, development control plan and design brief.
- ii) To evaluate the performance of the "as-built" facility in meeting current requirements
- iii) To establish the changes (if any) that would need to be made to the original assumptions and requirements, to meet current needs.
- iv) To prepare recommendations for modification, guidance in planning and developing new medical facilities and for future development of the medical facility that has been evaluated

There is not much that has been heard about the success of the POE undertaken by MOH. Saiful and Norhati (2010) stated that the POE programme initiated at MOH has not evolved since its introduction in 1997, and much has yet to be significantly explored. The available programmes focussed on specific areas of interest that was inclined towards generating measured environmental and services

performance data, or occupant responses and satisfaction (Saiful and Norhati, 2010). Saiful and Norhati (2010) further added that several MOH's POE practices do not correspond with procedures suggested in the literature to ensure effective flow of feedback.

6. THE LEVEL OF AWARENESS AND KNOWLEDGE OF PRACTITIONERS IN MALAYSIA ON POE

A pilot survey was conducted as an initial part of a PhD research entitled 'Post Occupancy Evaluation of Building Performance in Malaysia' that involved three groups of respondents consisted of architects, developers and facility managers in order to determine their level of awareness and knowledge on POE. Considering the various benefits rendered from carrying out POE as discussed previously, it is important to understand how the practitioners in the Malaysian construction industry perceive POE and the extent to which they are familiar with the approach. The pilot survey was undertaken to verify whether the issues pertaining to the practitioners' disregard on POE (as discussed previously) is true in the Malaysian context, and to the further widen the scope of Zuriati's (2005) findings into other practitioners in the construction industry, and not constrained merely within the facilities management organisation. The aim of the survey was:

- i) To identify the level of awareness of the practitioners in the construction industry on the need to foster user feedbacks for building performance evaluation (POE), and
- ii) To learn whether they possess the knowledge on how to foster user feedbacks in the evaluation of building performance (POE).

Three groups of respondents were selected for the pilot study that comprised 50 architects; 50 facilities managers; and 50 developers. A short questionnaire comprising questions related to their experience and familiarity with post occupancy evaluation was prepared. The questionnaires were mailed to the respondents. After strenuous follow ups, 43 architects, 37 developers, and 50 facilities managers responded. Though few compared to the actual population, statistically, the number of responses obtained was sufficient to achieve a reliable result for the pilot study as reliability is established by collecting data from 20 to 30 research samples (Radhakrishna, 2007). The data was then analysed using simple frequency calculation.

The summary of the findings are shown in the Table 2 and 3.

Table 2. The Perception of Practitioners On User Feedback Studies/ POE

Question categories	Architects		Developers		FM Managers/ Officers	
	Yes	No	Yes	No	Yes	No
The importance of user feedback studies in building performance evaluation	45%	55%	37%	63%	92%	8%
The benefit of user feedback studies in providing information for better building design	23%	77%	32%	68%	97%	3%
The need to incorporate user feedback studies as part of the building design and construction process.	27%	63%	26%	64%	73%	27%
Interests to take part in user feedback studies/ POE for building performance evaluation	2%	98%	4%	96%	92%	8%

Table 3. The Knowledge of Practitioners On How to Audit User Feedbacks

Question Categories	Architects		Developers		FM Managers/ Officers	
	Yes	No	Yes	No	Yes	No
Familiarity with user feedback study methods for building performance evaluation.	3%	97%	4%	96%	12%	88%
Experience in user feedback studies for building performance evaluation.	0%	100%	0%	100%	6%	94%
Knowledge on how to use data from user feedback studies in decision making.	0%	100%	0%	100%	2%	98%

The figures shown in the Tables 2 and 3 demonstrate the level of awareness and knowledge of the practitioners in Malaysian construction industry on post occupancy evaluation. The questions dealing with the awareness of the practitioners could be divided into 3 main categories:

- i) The importance of user feedback studies in building performance evaluation
- ii) The benefit of user feedback studies in providing information for better future building design.
- iii) The need to incorporate user feedback as part of the building design and construction process
- iv) The interests of practitioners to take part in user feedback studies/ POE for building performance evaluation.

In general, the figures indicate that:

- i) 58% of the practitioners in Malaysia say that user feedback studies are important for building performance evaluation.
- ii) 51% of the practitioners in Malaysia say that user feedback studies is beneficial for the improvement of building design
- iii) 58% of the practitioners in Malaysia say that user feedback studies should not be part of the building design and construction process.
- iv) 67% of the practitioners in Malaysia say that they are not interested to take part in user feedback studies for building performance evaluation.

Interesting enough, when looking at the responses of practitioners by group, a different pattern takes shape:

- i) Importance of user feedback studies for building performance evaluation: 55% of architects say 'not important', 63% of developers say 'not important', and 92% of Facilities Managers/ Officers say 'important'.
- ii) Benefit of user feedback studies for improved building design: 77% of architects say 'not beneficial', 68% of developers say 'not beneficial', and 97% of Facilities Manager/ Officers say 'Beneficial'.
- iii) The need to incorporate user feedback studies as part of building design and construction process: 63% of architects say 'no', 64% of developers say 'no', and 73% of facilities managers/ officers say 'yes'.
- iv) Interest to take part in user feedback studies/ POE: 98% of architects say 'not interested', 96% of developers say 'not interested', and 92% of facilities managers/ officers say 'interested'.

It is strongly suggested by the survey that most of the practitioners in the Malaysian construction industry who are directly involved in the design and development of buildings (architects and developers) perceive user feedback studies for the evaluation of building performance (POE) as insignificant. The management team (facilities management) however acknowledges the importance of POE in the effort to achieve continuous improvement of building performance.

In terms of the knowledge on how to audit user feedbacks for the evaluation of building

performance, it is clearly demonstrated by the survey that a large majority of the practitioners are unfamiliar with the method and technique to audit user feedback. 100% of the architects and developers, and 98% of the facilities managers/ officers are not familiar with what method to be used, what and how to evaluate building performance subsequent to occupancy, and how to translate the data into workable information for decision making. As POE is still at its infancy in Malaysia, the extremely low level of knowledge of the practitioners on how to carry out a formal post occupancy survey that incorporates user feedbacks of completed buildings is understandable. The pilot survey results not only support to the findings by Zuriati (2005), they also show that architects and developers (not only facilities managers) are not familiar with POE.

7. FACTORS THWARTING THE IMPLEMENTATION OF POE

The lack of awareness and knowledge to audit user feedback as part of the effort to evaluate the performance of buildings are the main reasons why we lack information on how our buildings are actually performing. The reasons for the lack of awareness and interest to foster POE as part of the building design, construction and management process may differ from each group of practitioners. However, it has been suggested by various authors that the factors that mitigate against Post Occupancy Evaluation of building performance are:

- i) Professional territory
No active building professionals seek to have their work judged by outsiders as part of a process over which they have no control, even if the goal is a better understanding of a situation and not a performance review of a participant. (Vischer, 2002)
- ii) Cost
The cost barrier is intrinsic to the structure of the real estate industry, namely, who pays for POE? POE is not built into the architect's fee, the construction bid, the move-in budget, or the operating budget of the building. (Vischer, 2002)
- iii) Time
Every new building project has a rushed and constraining schedule. Going back

for a follow-up look at a building, however, is bound by the time pressures of new projects, and as a result, finds no place in the phases of a conventional building project. (Vischer, 2002)

- iv) Skills
Undertaking user feedback studies such as POE demands skills which are so broadly defined as the term itself has come to be applied to a wide range of activities, ranging from precise cost-accounting evaluations to technical measurements of building performance to comprehensive survey of user attitudes. This broad definition of skills means that no one individual of certain disciplines is likely to have all that are needed, therefore fall through the cracks. (Vischer, 2002)
- v) Education and Attitude
Practitioners in the construction industry have no interest to take part in POE. According to Riley, Kokkarin and Pitt (2010), and Bordass and Leaman (2005) this is due to the fact that practitioners are not trained in building performance evaluation and are not paid to carry out the evaluation process. Cooper (2001) in Riley, Kokkarin and Pitt (2010) also stated that, in the early 1990s the concept of POE was nearly removed from the curriculum of architecture because of the lack of regard to POE within the real estate industry. Zimmerman and Martin (2001) in Riley, Kokkarin and Pitt (2010) further noted that the "ignorance is bliss" mentality exists within the practitioners in the construction industry and it is totally in contrast with methods such as POE. Building owners on the other hand refuse to conduct POE which they fear would extract shortcomings and reveal the weaknesses of the building, which may lead to the tenants moving out from the building (Riley, Kokkarin & Pitt, 2010). Building owners often assume that the POE activities will reduce the value of their assets.
- vi) Ownership for POE
Professionals such as architects, interior designers, and facilities or property managers are likely to deflect the ownership for POE because they refuse to become liable for any new problems or

costs associated with POE (Riley, Kokkarin & Pitt, 2010). Building owners on the other hand refuse to take the ownership due to the concern of the negative results that might be generated from the POE activities that will reduce asset value (Riley, Kokkarin & Pitt, 2010).

vii) Participation and Commitment

Due to constraints in the construction schedule, POE has been regarded as insignificant by practitioners in the construction industry. This has led to the lack of participation among the practitioners in POE (Federal Facilities Council, 2001). Attracting attention from clients to participate in POE activities or luring parties who were originally not involved with the project to participate and contribute in the survey is also said to be a barrier (Federal Facilities Council, 2001).

viii) Standard Practice

POE is not part of the standard facility or building delivery process and there is no provision in the legislation for POE. Within the process of building and facilities delivery, the standard practice does not recognise the concept of continual improvement through the implementation of building performance evaluation such as POE (Zimmerman and Martin, 2010).

ix) Indicators and Benchmarks

There is no clear indicator or benchmark to determine what is required for a building to function as intended. What is the definition of a good building? Though numerous literatures and studies on POE are available, there is a still a gap of what are the actual building performance criteria, as well as the

parameters that need to be considered in post occupancy evaluation of building performance (Izran, 2011, Brooks and Viccars, 2006, Becker, 1990, Kincaid, 1994, and Kooyman and Haylock, 2006). As POEs are tailored to the specific circumstances of the building and its occupants (the aspects of evaluation are tailored for a specific building only), the results obtained from a POE study rarely become part of a systematic database, does not permit comparisons with other buildings, with other sectors of the industry, or with earlier time periods, and confined to identifying and occasionally correcting oversights and defects in the building (Becker and Sims, 1990).

x) Managing the Information

In the practical world of building design, construction, and management, most organisations have no established system for knowing what to evaluate, how to process, direct, and act on the information they receive from POE (Vischer, 2002). This is due to the complexity of the design process, the unclear usefulness of user satisfaction surveys (on which what POE is often based), the primarily negative feedback received from POE of building performance, and the direction to which the evaluation result is to be channelled.

The validity of these factors were tested in a recent survey involving 30 building designers (architects and interior designers) and 30 building managers (facilities managers and property managers) in the Klang Valley and Johor Bahru, Malaysia. The result of the survey is as shown in Figure 1.

Cost	(0.810) – Rank 1
Time	(0.763) – Rank 2
Education and Culture	(0.753) – Rank 3
Complexity of managing the information	(0.752) – Rank 4
Skills	(0.733) – Rank 5
Complexity of the design process	(0.730) – Rank 6
Participation and Commitment	(0.723) – Rank 7
Standard Practice	(0.720) – Rank 8
Ownership for POE	(0.693) – Rank 9
Usefulness of user's survey	(0.653) – Rank 10
Indicator and Benchmarks	(0.643) – Rank 11
Professional Territory	(0.627) – Rank 12
Primarily negative feedback	(0.590) – Rank 13

Figure 1. Rank of the Factors According to Criticality Index

The result shows that 'Cost' is the most critical factor that thwarts the implementation of POE in Malaysia. Factors that include 'Time', 'Education and Culture', 'Complexity of Managing the Information', 'Skills', 'Complexity of the Design Process', 'Participation and Commitment' and 'Standard Practice' are almost equally critical (with minor index differences). The other factors that scored less than 0.7 have less significant impact on the implementation of POE in Malaysia.

The author however hypothesises that the major reason to the factors listed in Figure 1 is unclear Return of Investment (ROI) from the undertaking of POE. As in any strategic and tactical ventures, the benefit that can be gained in the form of hard cold cash is the ultimate driving force. When the ROI is clear, interests will escalate and mechanisms will be devised to make sure that POE becomes a common practice in the construction industry. Unfortunately, due to the nature of POE that deals with both tangible and intangible aspects of building performance, it is difficult to quantify the benefit that can be gained from implementing POE.

8. THE NEED FOR AWARENESS AND KNOWLEDGE ON POE

Practitioners in the construction industry and facilities management alike need to get closer to

the users. It has been highlighted by practitioners that auditing user feedbacks for building performance evaluation raises issues pertaining to cost and time and above all, not stated as a requirement in any contract or policy. However, the complete cycle of the benefit should be clearly put into perspective. Though gaining profit is undoubtedly the main goal, learning from the experience of the users will promote continuous improvement of the buildings that we build. This in return will lead to the elevation of satisfaction, improvement of work efficiency, increased production, and of course luring more projects for the builders.

Practitioners also state that in spite of understanding the concept of POE, they are unfamiliar with the methodology. Most POEs are carried out as academic research and have been comprehensively discussed in journals and conferences. However, in the practical world of building design, construction, and management, most organisations have no established system for knowing how to process, direct, and act on the information they receive from POE (Vischer, 2002). Thus, it is imperative for a study to be undertaken to develop a framework of what parameters to be included in POE, what methodology to be used, and how to process the POE data into workable information, acting as a guideline for the practitioners in the Malaysian construction industry upon adopting POE as a tool for building performance evaluation.

Learning from the extensive literature about POE, benchmarking POE practices in other countries, and deriving the most suitable POE framework in the our own context will be of utmost assistance to shed light to the practitioners on how to carry out POE for continuous performance improvement of the buildings that they deliver.

9. CONCLUSION

This paper has discussed the need for awareness and knowledge among practitioners in the construction industry on POE. The results from the pilot survey discussed earlier clearly indicate that the construction industry needs a paradigm shift to become more aware and interested to learn from what has been delivered to the users. The literature findings have been articulate about the need to foster user feedbacks as an essential part of the building design, construction, and management process. Adopting POE enables practitioners in the construction industry to establish a true understanding of real building performance based on the experience of the occupants themselves. POE allows the buildings to 'talk' to the builders and managers through the occupants about how it is performing and how it can be improved. Various researchers and practitioners have acknowledged the significant building performance improvements that can be achieved by fostering POE in building performance evaluation as a standard practice in the construction industry. However, POE is a mere tool to provide essential information for improved building performance. Without the awareness and knowledge to use the tool, continuous improvement of building performance will only be an idea to be achieved.

There is also a knowledge gap about how to foster POE for building performance evaluation and further studies on developing a POE framework, what mechanism to be used, how it is to be implemented, who should be involved, etc., are inevitably needed.

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