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Critical Success Factors for Post Occupancy Evaluation of Hospital Building Performance

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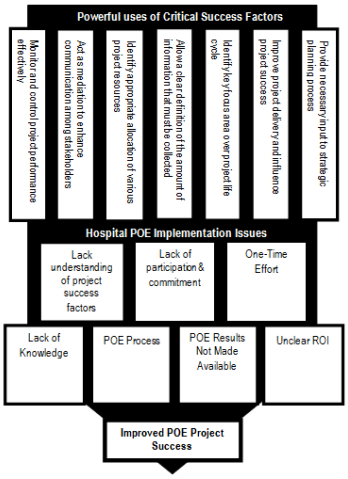

Abstract

This paper discusses the importance of critical success factors (CSFs) for post occupancy evaluation (POE) of hospital building performance. Recent failures of hospital buildings in delivering the expected service have raised the need for POE of their actual performance. However, POE of hospital building performance is a difficult undertaking and requires a vast amount of resources. Management, competencies, culture and awareness have been recognised as the factors that impede the success of POE projects. This demands the identification of the critical success factors (CSFs) that will enable POE projects to be undertaken without the success-impeding factors aforementioned, hence leading to successful POE projects. Despite the numerous studies on POE, the CSFs for POE have not been investigated. This leads to a knowledge gap of what are the actual CSFs that need to be considered in ensuring the success rate of hospital POE projects. By reviewing various related literatures, this paper attempts to generally look at the possibility of conducting a study on CSFs to ensure the success of hospital POE projects. This paper will eventually review the need for CSFs for POE of hospital building performance.

Keywords: Critical success factors (CSFs); post occupancy evaluation (POE)

Abstrak

Kertas kerja ini membincangkan kepentingan faktor-faktor kejayaan kritikal (CSFs) untuk penilaian selepas menduduki (POE) prestasi bangunan hospital. Kegagalan bangunan hospital dalam memberikan perkhidmatan yang diharapkan telah meningkatkan keperluan bagi POE prestasi sebenar bangunan tersebut. Walau bagaimanapun, pelaksanaan POE prestasi bangunan hospital merupakan satu usaha yang sukar dan memerlukan sejumlah sumber yang besar. Pengurusan, kecekapan, budaya serta kesedaran telah diakui sebagai faktor-faktor yang menghalang kejayaan projek-projek POE. Ini memerlukan pengenalpastian faktor-faktor kejayaan kritikal yang akan membolehkan projek-projek POE dijalankan dengan berjaya, sekiranya tanpa faktor-faktor menghalang kejayaan yang dinyatakan di atas. Walaupun terdapat banyak kajian berkaitan tentang POE, CSFs bagi POE sebagai projek yang berjaya tidak pernah dikaji. Ini membawa kepada jurang pengetahuan mengenai apakah CSFs yang perlu dipertimbangkan dalam memastikan kadar kejayaan projek-projek POE hospital. Dengan meninjau pelbagai literature yang berkaitan, kertas kerja ini secara umumnya melihat kemungkinan menjalankan kajian CSFs untuk memastikan kejayaan projek-projek POE hospital. Kertas kerja ini akhirnya akan mengkaji semula keperluan untuk CSFs bagi POE prestasi bangunan hospital.

Kata kunci: Faktor kejayaan kritikal (CSFs); penilaian selepas menduduki (POE)

1.0 INTRODUCTION

The significance of integrating sustainability into building performance has been emphasised in recent years. Globally, there are growing efforts to undertake building performance evaluation with the intention to meet sustainability challenges.[1] This leads to the upbringing of Post Occupancy Evaluation (POE); an effective building performance evaluation approach

Benefits	Source
▪ Helps determine whether a building is functioning as the architect and owner intended ▪ Strengthen client-architect relationship ▪ Validate life cycle performance projections ▪ Enhance knowledge for developing design guidelines that challenge long-held, often erroneous assumptions ▪ Valuable in evaluating new technologies, including innovations in resource conservation, natural ventilation, use of daylight and photovoltaic	10
▪ POE as part of a feedback process can present a viable tool to design teams and facility managers	11

which requires the adoption of systematic procedures and techniques to determine the performance of buildings and their counterparts based on the perception of the designers, architects, facilities managers and occupants.

POE has played a significant role in the building performance evaluation literature since works began in the United Kingdom in the 1960s.[2-3] Although the importance of POE has been recognised by many, obstacles still exist to its wide spread adoption. The need for a systematic and deliberate study on the CSFs for POE is an essential task. Key participants in the construction industry need to be cognisant and aware of the factors that are critical to the success of a POE project.

2.0 THE NEED FOR POST OCCUPANCY EVALUATION

POE originated in the 1960's as a one-off building evaluation effort.[4] It then evolved into a cross-sectional evaluation in the 1970's and 1980's.[4] POEs are conducted by a wide range of practitioners for many different purposes. Thus, there is no common definition.[5] POE has been defined by Preiser, Rabinowitz and White 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".[6] POE is an important final step in the sustainable design process, aimed at collecting coveted energy and water use data, indoor environmental quality results, and occupant feedback for the purpose of helping building owners and designers to improve current and future buildings.[7] In short, it can be generalised that POE is a systematic evaluation tool that seeks to evaluate the performance of an occupied building with the intention to achieve continuous building performance improvement.

The success of building design cannot be confirmed without POE.[8] According to Manning (1987); cited in Ng and Zainal, there are three main purposes to conduct building performance evaluation: [9]

i) to learn how the existing buildings perform by amalgamating the opinions of building users and professionals
ii) to assess the possible consequences of various design options and their impact on performance
iii) to determine the extent to which the performance of the completed building meets the initial target performance specified in the design stage

Various other authors, building scholars and practitioners in the construction industry have largely acknowledged the benefits that POE can bring to the improvement of building performance as can be seen in Table 1.

Table 1 Benefits of POE

Benefits	Source
▪ Support for the development of design and planning guides ▪ Provision of information to the building industry ▪ Testing of new concepts ▪ Justification for major expenditures ▪ Education for decision makers (owners and designers) to avoid repeating past mistakes ▪ Improvement of building performance over time; i.e. remedy problems or adapt the facility to changing organisational needs ▪ Accountability of design professionals and owners for building performance ▪ Better communication among designers, clients, facilities managers and end users	12
▪ Allow a systematic study of a building once occupied, so that lessons may be learnt for future design improvement	13
▪ Reduce client's future cost ▪ Reduce whole-life environmental impact ▪ Reduce future liability of clients ▪ Maximise value of property portfolios ▪ Minimise maintenance cost ▪ Increase occupants satisfaction ▪ Increase design know-how	14

Since its initiation over 50 years ago, the concept of POE has gained universal approbation and is nowadays frequently used.[15-16] However, in practice, measuring building performance has not gained much interest from the practitioners in the construction industry.[8]

3.0 THE ISSUE

POEs have been conducted periodically across the public and private sectors[17-19] especially on high-impact buildings.[20] Among those high-impact buildings, hospitals are often prioritised by researchers in building performance evaluation (BPE) practices and facilities management (FM).[8,21-23] Ideally, a hospital should be a place where patient safety is assured; quality of care is paramount; efficiency is maximised; and the staff feels satisfied with their jobs, supported by the management and the work environment.[24] This however does not seem to be the case for most hospitals.[8,24]

In Malaysia, there have been unfortunate cases where hospital buildings failed to perform as they were intended to. In 2004, services at the Tengku Ampuan Rahimah Hospital, Klang was badly hit by a faulty air-conditioning system. Fungal appearance and ceiling collapse were reported at the Sultanah Aminah Hospital (HSA) Johor, Hospital Umum Sarawak (HUS) Kuching, Hospital Temerloh (HoSHAHS) Pahang, and Hospital Sultan Abdul Halim, Sungai Petani, Kedah between 2006 and 2007.[25] Problems pertaining to the accessibility, reachability, spatial orientation, aesthetics, well-being, flexibility in design, and safety have all been addressed by the users as problematic in Malaysian public hospital buildings.[26]

In the effort to enhance hospital building performance in Malaysia, the Ministry of Health (MOH) conducted 10 POE projects in 1997: 9 structured POE of the MOH hospitals, one POE of rural health clinic and 3 private hospitals.[1] However, there is not much that has been heard about the success of the POEs undertaken by the MOH.[27] A number of problems related to the 1997 MOH POE projects have prevented the optimum anticipated benefits from materialising. The POE carried out was merely a one-time effort.[1] Without continuity, the POE results is limited to only rectifying defects without the possibility to continuously improve building performance. The 1997 MOH POE was reminiscent to a mere user satisfaction survey which lacks the proper POE procedure, employment of relevant parameters, and data collection techniques.[1] The final flaw relates to the utilisation of the POE results. The 1997 MOH POE results were not effectively disseminated due to the absence of a POE database system.[1] Informed-decision making at every level is highly dependent on the availability of a systematic information distribution system. This unfortunately was missing in the 1997 MOH POE project.

One of the reasons that leads to the failure of POE of hospital building performance is the lack of knowledge among key participants regarding building performance evaluation. According to Zuriati Ashaari in her Master's research project, full knowledge on the practice of POE in FM organisations in Malaysia has yet reached practitioners.[28] Zuriati's research findings are similar to the findings of the pilot survey and interviews conducted by Mastor and Ibrahim and Izran respectively.[1,8] There appears to be unfamiliarity amongst the key participants on the feedback potential of POE programmes and its mechanism. The findings of these three studies have proven that practitioners in the Malaysian construction industry lack knowledge on POE of building performance. The findings support and confirm the issue identified by Zimmerman and Martin in which designers and other key participants in the design process have never heard of or been involved in POE.[29]

Even though there is increasing interest in conducting building performance evaluation, it is rare for the people who procure, design and construct buildings to closely engage, document and analyse the performance of the buildings they have delivered.[11,30] Subsequent to the completion of a building, designers, contractors and developers proceed to the next project rather than going back for a follow-up look at the building.[8,30] In practice, even if such assessments were conducted, it would most likely be a one-time effort.[8] It has been accepted as almost a custom for the building practitioners to measure building performance as a one-off effort.[31] For instance, POE programme initiated at the MOH has not evolved since its introduction in 1997.[1] POE should be well-promoted as an essential performance measurement approach and developed consistently in our local construction industry to achieve continuous improvement of building performance.

POE is perceived as an overhead and "optional extra" rather than a "critical input".[33] The main problem here is that facilities and property managers don't understand the benefits they can gain by conducting POE. Designers and architects fear that they will be judged by POE results and from their perspective, no incentive exists for continuous improvement through the feedback process. End users on the other hand do not even know about POE and would mostly settle for renovations and retrofits to solve building performance issues that they are confronted with. This lack of a clear causal link can make it difficult for POE proponents to convince decision makers that the benefits received will justify the expenditure of time and money on the evaluations. This is pursuant to Cooper's point of view, wherein "client organisations are unlikely to pay for POE unless the benefits of such evaluations are both evident and add substantial value".[34] Otherwise, the idea of continuous improvement might simply be left alone.[4]

The process of POE is seen as critical to POE success.[31] In order for a hospital POE project to succeed, each step of the project should be managed efficiently and effectively. Correspondingly, managing the POE process has become a challenge for building practitioners as it requires extensive financial, human resource and is time sensitive. According to Vischer, the importance of the process used in carrying out POE cannot be underestimated.[31] Vischer further emphasised that the POE process is more significant than the method selected and the data gathered.[31] To achieve this, organisations need to establish standardised POE process if they are to be successful.[35-37] Two POE studies conducted by the Ministry of Health, Malaysia and the Military Health System of the United States were failures due to unstandardised POE process. Successful POE projects in the past all share a similar trait of having a standardised POE process that ensures effective flow of feedback.[1]

One of the major problems associated with hospital POE failure is its results are not available to decision-makers.[38] Information from POE is valuable to building owners, designers, facilities managers and developers wherein the increased knowledge can be used to add value to the next project.[29,39-40] However, in practice, the top management tends to neglect POE information. Zimring stressed that none of the six federal agencies in the United States, namely the U.S. Air Force, the Office of the Civil Engineer; the General Services Administration, the Public Buildings Service (PBS); the Department of the Interior, the National Park Service (NPS); the U.S. Navy, the Naval Facilities Engineering Command (NAVFAC); the U.S. Department of State, the Office of Overseas Buildings Operations (OBO); and the U.S. Postal Service (USPS), reported that POE information was used directly in their future real estate decision making and capital asset management.[38] With regards to the POE conducted by the MOH in 1997, none of the POE results were documented, analysed and published. Zuriati[28] and Norazmi[32] emphasised that designers and facilities providers tend to neglect the results of POE while designing new buildings. This situation is generally accepted in the Malaysian construction industry since there is no database system created and made available to maintain and disseminate the information and findings from past POEs.[1] This causes the information to be unavailable either to the upper-level management, the design team or the public.

Though there have been efforts to study or utilise POE in various local academic researches, none has been encountered that looks into how to improve the success rate of POE itself, despite the POE project failures in Malaysia as mentioned previously. Table 2 lists down the researches carried out by Zuriati[28], Nawawi and Khalil[25], Mastor and Ibrahim[1] and Izran[8] in the effort to explore POE in Malaysia.

Table 2 Review of previous POE based studies

Author	Scope of Study
Zuriati (2005)	Current Practice of POE in FM Organisation
Nawawi and Khalil (2008)	Proposed 6-Steps POE Guideline
Saiful and Norhati (2010)	A Procedural Model for A Successful Feedback
Izran (2011)	Building Performance Criteria and Performance Parameters for POE

Table 2 implies that POE studies in Malaysia have brought forward the scope of its implementation. Indeed, these studies have been proven to be mighty useful for those who intend to take up POE for performance evaluation purposes. The Public Works Department (JKR) was one of the parties that benefitted from the studies shown in Table 2 in their effort to produce the first guideline for POE in Malaysia back in 2012. However, there has yet to be any study locally or internationally that looks into the factors that need to be addressed in order to improve the success rate of POE projects. POE is not an easy activity to conduct. Rather it is a complex undertaking and requires a vast amount of resources. To ensure hospital POE success in Malaysia, the primary step is to identify the CSFs for POE of hospital building performance.

4.0 THE NEED FOR CRITICAL SUCCESS FACTORS

The concept of success factors originated in the field of Management Information System (MIS), developed by D. Ronald Daniel in 1961 and later redefined into critical success factors (CSFs) by Jack F. Rockart in 1979. According to Rockart, CSFs are "the limited number of areas in which results, if they are satisfactory, will ensure successful competitive performance for the organisation".[41] Rockart further defined CSFs as "areas of activity that should receive constant and careful attention from the management". [41]

Building scholars have acknowledged the advantages by incorporating CSFs in construction projects and facilities management. The advantages of identifying CSFs, as stated by Janice are "they are simple to understand, help focus attention on major issues, are easy to monitor, and can be used in concert with application implementation methodologies".[42] The powerful uses of CSFs have also been emphasised by James Dobbins and Richard Donnelly that include:[43]

i) identify the key concerns of the senior management
ii) assist in the development of strategic plans
iii) identify key focus areas in each stage of a project life cycle and the major causes of project failure
iv) evaluate the reliability of information system
v) identify business threats and opportunities
vi) measure the productivity of people

CSFs are well implemented and accepted in the context of Information System (IS). Peffers, Gengler and Tuunanen stated that "senior management has found CSF to be appealing for IS planning because they help justify the development of strategically important new systems, the benefits of which may be hard to quantify".[44] CSF approach has also gained interest and well conducted in the context of Project Management (PM)[45], Project Quality Management System[46-47], Total Quality Management[48-49], and Knowledge Management[50-51].

Success has always been the ultimate purpose of each project or activity such as construction and building projects.[52] Project success is the most debated topic in the management field.[53] Numerous studies have been conducted with the intention to investigate factors which lead to the successful completion of a project[54-59], the same goes for POE.[2,31,60-61]

The contributions of CSFs to organisations are indisputable. They are those conditions, factors and processes that are essential for achieving breakthrough performance within the organisation.[62] The study of CSFs is often considered as one of the vital ways to improve the effectiveness of project delivery. According to Yasin and Egbu, as part of the strategic planning process in the Facilities Management industry specifically in conducting building performance evaluation, identification of CSFs is essential.[50] It is aligned to the statement by Bullen and Rockart wherein CSFs are recognised as a necessary input to the strategic planning process.[63] It is evident that failure in identifying the CSFs across project phases is recognised as one of the vital difficulties in managing public construction projects.[64] Without a common understanding of the CSFs of a project, it is very difficult to monitor and control project performance effectively.[65] However, in Malaysia, the top management tends to neglect the importance to align the CSFs with the performance measurement to their organisation's strategy.[62] It is conceivable that identifying comprehensive CSFs for POE of building performance can be one of the important strategies to raise POE's success.

Once the CSFs for POE have been clearly identified, they create a common point of reference for the entire organisation which actually helps the key participants to direct and evaluate the success of the project implementation.[66] As a common point of reference, CSFs assist every participant in the POE team to know exactly what's more important. Caralli further asserts that "any activity or initiative that the organisation undertakes must ensure consistent high performance in these key areas; otherwise, the organisation may not be able to achieve its goals and consequently may fail to accomplish its mission".[66] Thus, by identifying the CSFs for POE, it will equip architects, designers, facilities/ property managers, and owners alike with the knowledge on the factors that need to be given the priority in planning, conducting and applying the indicative, investigative and diagnostic POEs. All these critical factors form an integral part of a successful POE. Failure to incorporate these critical factors would jeopardise the the success of the POE project. In a nutshell, addressing the CSFs for POE is the primary step to enhance the success rate of its implementation in Malaysia. Figure 1 demonstrates how CSFs are beneficial for improving the success of hospital POE projects.

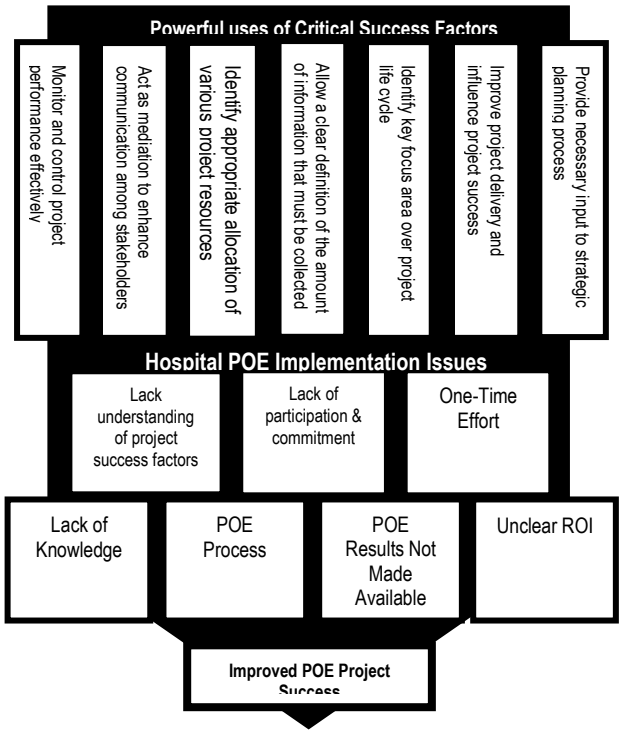

Figure 1 CSFs for improved success of a hospital POE project

5.0 CONCLUSION

By reviewing related literatures, this paper has attempted to look at CSFs as a possible approach to be adopted for a successful implementation of POE of building performance. Malaysia lacks empirical research in this area of study. Adding to the scenario, there has been no POE studies encountered on what CSFs that need to be considered in the evaluation of building performance. Though numerous studies on POE are available in Malaysia, to date, CSFs for POE have not been examined and investigated. This leads to a knowledge gap of what are the actual CSFs that need to be considered to improve the success rate of POE projects. The need for a thorough understanding on the CSFs for POE of building performance is becoming more important for achieving continuous improvement of building performance.

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