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Health Care Building Assessment through Post Occupancy Audit

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Abstract

Health care and hospital buildings are among the most complex construction in the built environment which comprises a broad range of utility, services, and functional units. The objectives of the study are to review the built environment performance level of the public teaching health care hospital in meeting user's need. Three (3) public training health care hospitals in Selangor district in Malaysia are selected as a case study sample. Based on the finding the study revealed that the correlation coefficient between technical building performance and the importance of POE Guideline are positively correlated based on security, safety, and efficiency and health criteria.

Keywords: Health care; public; training hospital; performance

1. Introduction

The building users are the people who understand how a building should perform. It does not only depend on its provided facilities but also on the design envelope and reliability of the building life (Hansen, 2010).Binggeli (2003), defined building performance as to ensure that buildings perform precisely to the diverse range of user needs and requirements. Health care buildings are among the most complex structure that comprises a broad range of service and functional units. According to Miller et al.,(2002),a new concept of hospital and healthcare building emerged and started the transition from the traditional "provider-centered" to a "consumer-centered" healthcare system.

In Malaysia, as the population increases, the number of admissions and number of outpatient visits will increase, means there is more demand for healthcare services. Despite that, public health care and hospital in Malaysia still in the traditional "provider–centered" healthcare system compared to developed countries. Healthcare building and hospitals need reliant to gained information regarding user's satisfactions to assist in the diagnosis, management, and education for better and improved services and practices. Thus, through a study of healthcare employee commitment revealed the key predictors are organizational support, job skill enrichment, quality control, and a culture of continuous learning (Kontoghiorghes and Bryant, 2004). Post-occupancy evaluation (POE) seen as one of building appraisal, which provides an opportunity for an organisation to see how well

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a particular facility meets the user requirements. From various viewpoints with its purpose, POE able to improve the current situation and to aid in the design of conducive healthcare buildings.

2. Literature Review

The building's function is to provide comfortable shelter and space activities for the building occupants. The needs of residents are affected by the building performance and occupant's buildings evaluation. POE is a method to empower the occupant's opinion as the benchmark of building performance evaluation. It is a technique that is used to evaluate whether a building meets the user's requirement (Natasha, 2008). Wauters (2005), confirms the value of "user satisfaction surveys" as a herald to service-level benchmarking and successive recommendations in improving facilities and services.

2.1. Post Occupancy Evaluation (POE)

POE defined as a systematic evaluation process in which occupied buildings meets all occupant's requirements in term of design, occupancy and comfort. POE in the indoor environment factors approaches the best evaluation in internal occupant efficiency and activities. Nicol & Roaf (2005) states that with systematic POE assessment it does not only reduce the financial implication, but it also improve the life quality, productivity and building comfort. Effective learning and teaching in health care and hospital buildings should be carried out in conducive comfortable indoor environment as to make sure the students give full concentration and focus in teaching lesson (American Association for the Advancement of Science, 1990). UNESCO (2006), highlighted that the education management should give a social care in implementing a plan for rehabilitation, reconstruction and replacement of damaged school building. According Riley *et al.* (2009) there is no single, defined approach to POE, and the methods selected should base on the unique needs and objectives of conducting the evaluation respectively.

POE is the process of systematically evaluating the extent to which a facility, once occupied for a period, meets the intended organizational goals and user-occupant needs (Preiser*et al.*, 1988). S.Turpin*et al.* (2006) quoting Zimring*et al*. (2005) define POE as "examinations of the effectiveness for human users of occupied design environments." POE compares the actual building performance with explicitly stated human performance needs (Cooper *et al*., 1991). This method emphasised building occupants' needs and satisfaction without comprising the views of experts or the professionals involved. It is an environment evaluation methodology that examines the impact of the designed environment on human needs. Used as a feed forward process, POE can support evidence-based design throughout the planning and implementation of new and existing facilities (Friesen*et al*., 2008). POE is a generic term for various general programs, procedures and specific techniques for the assessment of existing buildings and facilities (Baird, 2001). It originates out of interest in learning how a building performs once it is built and how well it has met expectations of making users within the built environment. Generalised from the above definitions, Post Occupancy Evaluation is the formal evaluation process of a building that focuses on user satisfaction, measure with social science-based tools of interviews, surveys, discussion groups, systematic observation, and behavioral mapping for achieving continuous performance improvement throughout the building's lifecycle (Izran*et al*., 2007).

2.2. Methods and technology for POE data collection

According Rileyet al. (2009) there is no single defined approach to POE. The methods selected should decide upon based on the unique needs and objectives of those conducting the evaluation respectively. Base on Leaman (2003), who cited Bruhns, over 150 POE techniques is available worldwide, with 50 available within the UK. A guide to POE developed by the Higher Education Funding Council for England (HEFCE) offers a summary of established methods, and the associated techniques used for each. Table 1 below summarises the key characteristics of these existing POE methods available, which draw upon some techniques. These established methods can be adopted, and amended were necessary.

In any form of POE, each step in the phase should set out four criteria which are the purpose, justification for carrying, activities involved in conducting process, resources necessary to perform and the expected results. The degree and extent of POE studies primarily depending on the necessity and purpose of the POE to meet either the short, medium or long-term benefits, and the availability of funds (Saiful *et al*., 2010).

3. National Health Care

In 10th Malaysian Plan for the years 2011 – 2015, the project to work together towards improving health care system is based on the concept of "1 Care for 1Malaysia", with its relation to National Mission Thrust "To Improve the Standard and Sustainability of Quality of Life". As the population increases, the number of admissions and number of outpatient visits will increase. This means there is more demand for healthcare services. It is estimated that annually there is a 3% increase in admissions to Ministry of Health (MOH) hospitals. "1 Care" is a restructured national health system that is responsive and provides a choice of quality health care, ensuring universal coverage for health care needs of the population based on solidarity and equity. This shows it is necessary to stress the need for studies on health care and hospital-related operative efficiency for the purpose of comparatively assessing both systems and establishing efficient performance patterns (Boerma*et al*.,2010). In this respect, this study is to review and analyse the general performance satisfaction level of a public teaching hospital while it is also important to determine the criteria in which health care service quality should assess. Such criteria could be technical or functional (Babakus*et al*.,1992) or technical and process-related (Zeithaml*et al*.,2000). Weitzman (1995) suggests that health care quality can be defined in relationship to technological aspects of care, second to the interpersonal relationship between practitioner and patient, and third to the amenities of care. Intertwined with the quality of health care services is patient satisfaction – an important but grossly neglected measure of performance in Bangladesh. In the Western world, there is evidence that the public is inclined to pay more for care from quality institutions to satisfy customer needs (Boscarino, 1992). John (1992), suggests that health care providers are increasingly using higher levels of service quality to meet patients. Therefore, this research is to analyse the standard of satisfaction and perception of training students and hospital staffs in functional and technical performance through POE in teaching hospital buildings. Developing recommendations and improvements in the performance for giving better service and betterment environment for occupants' satisfaction in public teaching hospitals and health care building in Malaysia.

3.1. Hospital and healthcare building overview

The hospital is the most complex building type that comprises a broad range of services and functional units that serve and support many different users and stakeholders in one building. A continuously evolving functionality of a hospital makes it equip with highly complicated mechanical, electrical, and telecommunication systems that require specialized knowledge and expertise. Specialized consultants play a significant role in planning and design a hospital. Currently, there is not much data on public perception of the public hospitals buildings in Malaysia, nor we have ever ranked their performances on a national scale either.

3.2. Background of teaching hospital

A training hospital is a hospital that provides clinical education and training to future and current doctors, nurses, and other health professionals while delivering medical care to patients. They affiliated with medical schools or universities. The alternative term is university hospital and may be owned by a university or may form part of a wider regional or national health system. Some teaching hospitals also have a commitment to research and are centers for experimental, innovative and technically sophisticated services. For this multitude of functions, a teaching hospital must be owned by a medical school or a university but in terms of clinical service provision, it may be part of a national health system (Fauzi, 2012). In Malaysia, there are only three teaching hospitals which each under a medical faculty or university with the fourth (IIUM) scheduled to start operation in 2016. There are University Malaya Medical Centre, University Kebangsaan Malaysia Medical Centre and Hospital University Sains Malaysia. These Teaching hospitals are under the purview of the Ministry of Higher Education. Despite of the growth in undergraduate medical education over the last decade, causing the expansion of a new kind of hospital used for teaching where large state or public district hospitals are affiliated with both public and private medical schools for teaching purposes in addition to service provision and research for the affiliated university staffs. However, in this case, previously service oriented hospitals are made to function like a teaching hospital, allowing public hospitals to be used for teaching undergraduate medicine. Thus, creates the partnership between the public hospital and medical school. According to Fauzi (2012) Malaysia needs more hospitals, and the way forward is to build more teaching hospitals. IIUM teaching hospital project is a step in the right direction that will lead to an improvement in the healthcare delivery in the country.

4. Research Methodology

In this study, a questionnaire survey method and the interview are used to conduct the POE in teaching hospital building as a primary data gathering techniques. A semi-structured interview was carried out to the officer at selected teaching hospital, and preliminary survey questionnaires survey to respondents. The studies are expected to be distributed to the selected respondents in selected teaching hospital in Selangor district in getting the interviewees' responds, views and suggestions on the variables listed. At the second stage, returned questionnaire will be analyzed. This phase is necessary to analyse the data findings and to come out with the research analysis. Meanwhile, at stage three is crucial as highlighted by Naoum (2007), where he clarified that the process of analyzing the findings is the data needs to be presented clearly in a descriptive way, making reference to field notes and other data sources. This presentation of descriptive data is the way in which the researcher grounds the interpretive analysis in the actual data collected. At this stage also involves data synthesis obtained from the survey using the Microsoft Excel or Statistical Package for the Social Sciences (SPSS). Finally, the fourth phase of this research process will be a discussion on the conclusion and recommendation.

The first section (Section A) is the respondent profile. The questions were designed to scan respondent profile. It consisted of a period of occupation and years of working. The second section (Section B) is operational building performance. The questions designed are to identify the score of building performance in areas of functional and technical performance. Under this section, the questions are divided into two (2) main categories namely functional and technical performance. For technical performance, it consists health, safety, security, efficiency, durability, and adaptability. Meanwhile for functional performance criteria are functionality, social, psychology, aesthetics, operation and maintenance (O&M), comfort, circulation, culture and serviceability. According to each criteria parameters that clearly described in the table, the respondents must rate the score for building performance in the related box by considering the building which range from Poor to Excellent (1 to 4) and highlighted the issues or problems in areas of functional and technical performance. On the third Section C is comment and suggestion, where three (3) open-ended questions are provided. Lastly, (Section D) is the importance of performance criteria to POE of building performance, the questionnaire is designed to identify the importance of establishing performance criteria in two categories that are technical and functional. Rated on the scale of 1 to 4 where; 1 is very important, 2 is not important, 3 is important and 4 is very important.

5. Data Collection

Seventy-five (75) sets of questionnaires distributed to each of the three hospital building which are University Malaya Medical Centre, UMMC, University Kebangsaan Malaysia Medical Centre (UKMMC) and Hospital Sg.Buloh. Total distributed questionnaire to respondents is 225 respondents that comprised of administrative staffs, training students and clinical personnel. Technical performance criteria's evaluation is 'Health', 'Safety', 'Security', 'Efficiency', 'Durability', 'Adaptability'. Meanwhile the functional performance criteria's evaluation are 'Functionality', 'Social', 'Psychology', 'Aesthetics', 'Operative and Maintenance (O&M)', 'Comfort', 'Circulation', 'Culture' and 'Serviceability'.

6. Result and Discussion

Discussion on the results cover the general overall analysis on public teaching hospital's building performance review in respective to functional and technical performance, in the pursuit of determining the score performance either under poor, good, very good or excellent performance in current public teaching hospital in Malaysia. The frequency calculation was carried out to determine the rate of level of building performance for each of the technical and functional performance criteria, by taking means as an indicator to calculate the frequency of its percentage score. The results gained from this questionnaire can assist in the portrayal the general review performance level of the public training hospital in meeting user's need based on the evaluation of the respondents performance score.

6.1. Technical performance criteria

Figure 1 shows the score percentage of building performance evaluation by the users for technical performance criteria in their workplace. Overall building performance (technical performance) standards for University of Malaya Medical Centre is in a magnificent satisfaction, respondents have rated 'Security' as the highest score as 18.68% for the best performance evaluation compare to others criteria listed under technical performance criteria. 'Durability' scores 16.67 % as the second highest score for criteria for building performance marked as excellent satisfaction by the respondents followed by 'Health' scores 16.28%, 'Safety" and 'Efficiency' scores 16.21% respectively and the lowest scores is 'Adaptability' as 15.95% only. For Hospital Sg. Buloh, its technical performance is in a very good condition with one criterion rated as excellent as the highest scores of all technical criteria which are 'Security' scores 18.18%. Meanwhile, 'Durability' as the second highest scores 16.76% followed by 'Health' scores 16.47%, 'Efficiency' scores 16.35%, 'Safety' scores 16.18% and 'Adaptability' scores 16.06%. Meanwhile, UKM Medical Centre overall technical performances rated as very good. As 'Safety' the highest scores 17.05%, followed by 'Health 'and 'Security' respectively 16.74%, 'Durability' scores 16.68%, 'Efficiency' scores 16.55% and 'Adaptability' scores 16.24%.

In conclusion, between the three case studies, Hospital Sg.Buloh rated as the best condition of building performances in terms technical criteria followed by UKM Medical Centre and University Malaya Medical Centre. Despite, UMMC is rated as the lowest technical performance rated its 'Security' hits the marked as the highest scores of all training hospitals. The chart above is the summary of the three teaching hospital's building performance been discussed.

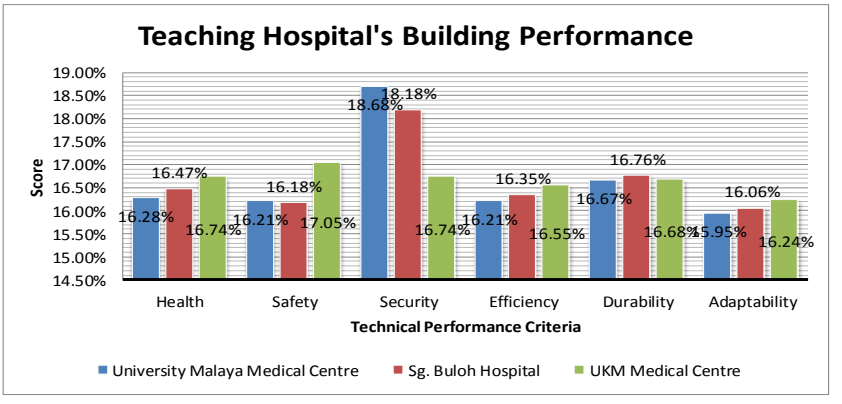

Fig.1. General review teaching hospital's building performances in terms of technical performances criteria

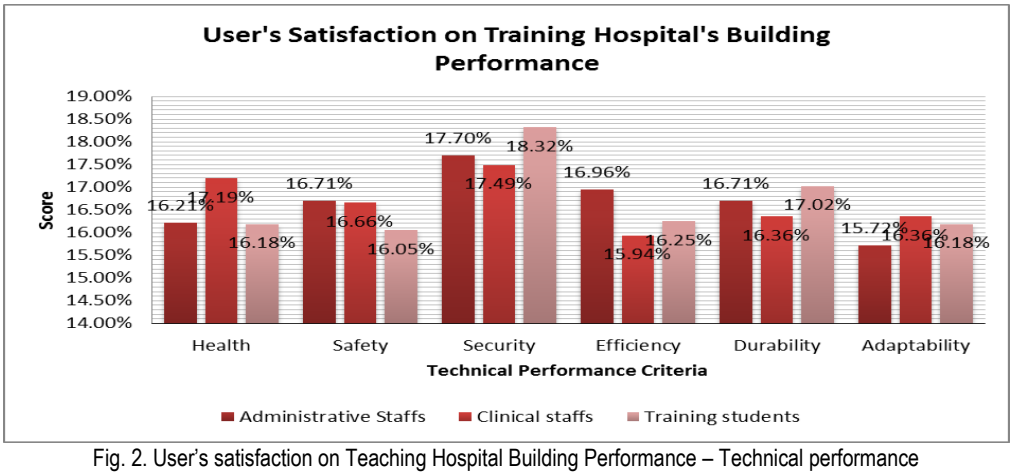

Fig. 2. User's satisfaction on Teaching Hospital Building Performance – Technical performance

The graph of figure 2 illustrated the user's satisfaction with public teaching hospital's building performance of technical performance criteria based on the data analysed above. From the pattern of the graph, majority of users voted 'security' as the

most satisfied technical performance criteria provided in public teaching hospital, where training student (18.32%), administrative staffs (17.70%) and clinical personnel (17.49%). Meanwhile, the lowest percentage of satisfaction is the adaptability, where administrative officers voted as the lowest 15.72% followed clinical teams (16.36%) and training students (16.18%).

6.2. Functional performance criteria

Figure 3 shows the score percentage of building performance evaluation by the users for functional performance criteria in their workplace. Overall building performance of functional performance criteria for University of Malaya Medical Centre is in 'good' state, where only two out of ten tests were evaluated as 'very good' category, which determined criteria 'Culture' as the highest scores 12.24% , 'Serviceability' as the second highest scores 11.77% and 'Circulation' as the lowest scores 10.18% only. Hospital Sungai Buloh's technical building performances are all in a very good state. Most of the respondents evaluated 11.27% of 'Social' and 'Culture' as the best technical performance in their workplace. Similar to UMMC, 'Circulation' scores 10.27% contributed as the lowest satisfied among the criteria. As for UKMMC, the users evaluated general review of its functional performance in the very good state, given 'Culture' and 'Serviceability' as the highest percentage respectively 11.65%. This is also rated 'Circulation' as the lowest scores 10.84% by its users.

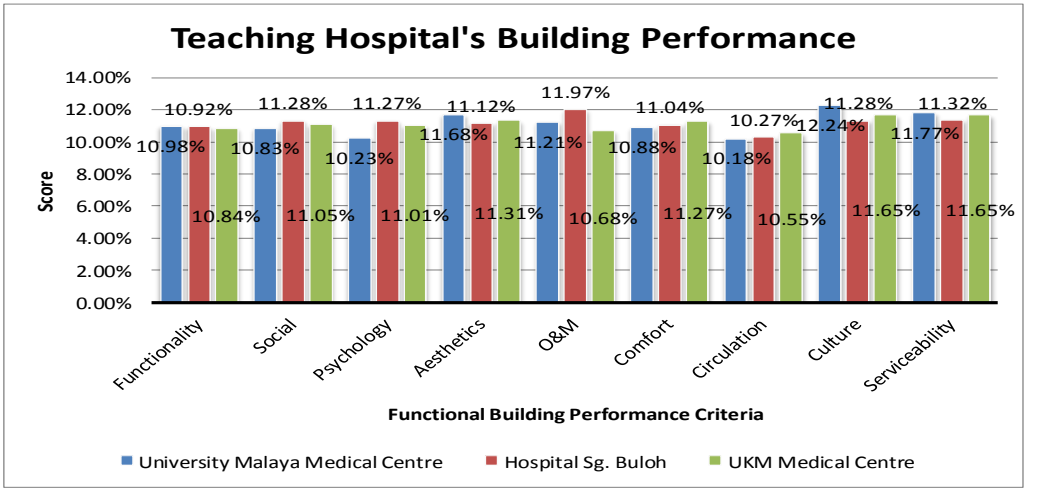

Fig. 3. General review of building performances for training hospital in functional performances criteria

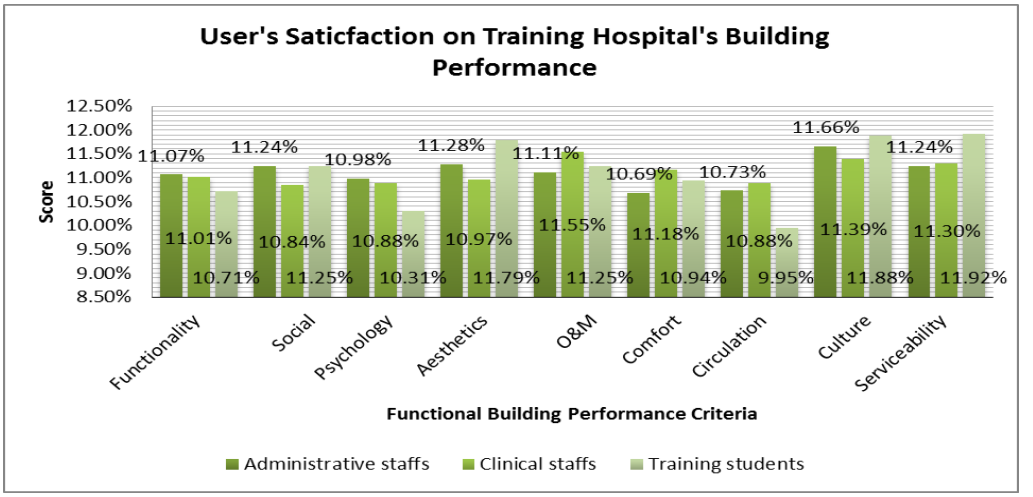

Fig. 4. User's satisfaction on Teaching Hospital Building Performance – Functional performance

From the figure 3, among three case studies above, it can be concluded that in public training hospitals, users mostly satisfied with the functional performance of its culture and serviceability but does not satisfy with the planning circulation of the building. The functional building performance criteria rated by the respondent were mostly range 10% to 11.92%. These proofs they are somewhat satisfied. Training students vote the highest score percentage satisfied on serviceability and the lowest scores 9.95% for circulation also voted by training student. Figure 4 shows the summary of detail result.

7. Conclusion and Recommendation

The objectives of this research generally to review the building performance and user satisfaction of public health care and teaching hospital building irrespective to POE functional and technical performance criteria. This study analysed the current score performance of public teaching hospital building's conditions either in poor, good, very good or excellent performance. The results gained from this analysis portrayed the general review on current performance level in the public teaching hospital. It would recommend for public teaching hospital managers to improve healthcare management policy on patient satisfaction activities in public teaching hospitals for betterment in the future. The establishment of a patient satisfaction committee in the hospitals, initiate human resource training in patient satisfaction and enhance research and development on standardized patient satisfaction survey instrument will assist the public healthcare and hospital building fulfill the user's satisfaction.The comprehensive documentation in the context of knowledge during planning and implementation, design expectations and how decisions are being made can be used by the design consultant and hospital managers as a reference data to improve the specific services area for future design.

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