



Performance Review through Post Occupancy Audit on Refurbished Listed Public Building in Kuala Lumpur

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Abstract

Malaysian public listed buildings are valuable assets, for their architectural landmark and tourism potential. Refurbishment works are carried out to keep the original design characteristics while maintaining their functions. The study aims to review through Post Occupancy Audit/Evaluation (POE) concept in identifying performance issue and to determine the functional performance satisfaction level from the occupants perspective. Another aim is to develop a conceptual conducive design guideline or framework for future refurbish public building. The finding revealed that building performance criteria highly correlated with the occupant's satisfaction.

Keywords: Refurbishment; Public Building; Post Occupancy Review; Performance and Satisfaction

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1.0 Introduction

Historical buildings in Malaysia are unique and valuable assets, for their historical values and tourism potential (Feilden, 1994). A historical building has architectural aesthetic, historic, economic, social, and even political and spiritual or symbolic values. Majority of it can be found in urban areas while some in rural areas. The country's capital has many architectural landmarks built over the last 200 years. The city has many interesting historical public buildings such as Sultan Abdul Samad Building, Kuala Lumpur Memorial Library, National Museum of History, Kuala Lumpur Railway Station, and Kuala Lumpur Textile Museum with Moorish, Tudor, Neo-Gothic or Grecian-Spanish style of architecture.

Unfortunately, most of those buildings are generally susceptible to deterioration due to poor maintenance and restoration methods thus needs to be refurbished. According to Burden (2004), refurbishment means to bring an existing building up to standard and make it suitable for a new use by renovations, installation of new services and equipment, fixtures and finishes. Refurbishment is considered as a minimal repair in order to enable the building to be fit for its purpose. POE can be defined as the process of evaluating buildings in a systematic and rigorous manner after they have built and occupied for some time (Isaac, 2009). POE is important in building performance evaluation as it comprises the techniques that are used to evaluate whether a building meets the user's requirement (Khalil, et. al., 2008a).

Problem statement

Refurbishment construction project has become one of the important sectors in the Malaysian construction industry. However, there are several issues and challenges in dealing with the refurbishment work in historical public buildings project. Among those issues are its inherent complexity and uncertainty nature of work (Ali, et al., 2009), difficulties in matching new construction materials with the present original materials as the required materials are no longer in production and aging factor. Another issue is the industry is regulated by heritage regulations and restrictions (Ahmad et. al., 2009) and were also built with minimum passive fire fighting requirement (Kamal et. al., 2004). This constraint will affect new functional performance in areas of space design, security and safety, comfort, strategic value and operational cost.

Research aims

The research aims is to identify building functional performance of refurbished historical public buildings in Malaysian construction industry through Post Occupancy Evaluation (POE) concept. Secondly to highlight issues and problems in the refurbishment industry and to propose a conceptual conducive design guidelines for future refurbish public building in creating awareness to designer and building management team which finally enhance to occupants' satisfaction.

Scope and limitation of the research

The study sample area taken are within Kuala Lumpur City Centre build over 100 years. Secondly the selected case study is low rise four storey building and selected based on 4

months to 24 months after refurbishment work completed. The performance evaluation (POE) done is centred in areas of functional assessment only. Due to unavoidable circumstances, the researchers only managed to conduct seven (7) case studies out of eight (8) total samples numbers. The case studies are (1) Sultan Abdul Samad Building, Kuala Lumpur (2) Kuala Lumpur Textile Museum Building (3) Kuala Lumpur General Post Office, (4) The Kuala Lumpur High Court, (5) *Keretapi Tanah*

2.0 Literature Review

Post Occupancy Evaluation

POE serves as a feedback in planning and design requirement throughout the building's life cycle from the initial design to occupation (Isaac, et al., 2009). Preiser et al. (1988) defined POE as the process of systematically evaluating the extent to which facility, once occupied for a period of time, meets the intended organizational goals and occupant needs. Indeed, POE is a platform for the systematic study of buildings once occupied. It will improve the building current conditions and as a guide for future buildings designs. It provides an insights into the consequences of past design decisions and enhance building performance benchmark evaluated between 4 to 24 months after building occupancy (Khalil, et al., 2008a). Preiser et al., (1988), states that basically there are three (3) phases involved in conducting POE which comprise of planning, conducting and applying stage.

Criteria of building performance evaluation and refurbishment

In brief, POE is important in building performance evaluation as the technique evaluate whether a building meets the user's requirement in respective to functional performance evaluation. It addresses how well the building supports the organisation's goals and how well the user needs are supported (Blyth, et. al., 2006). The areas of functional performance evaluation are Strategic Value, Aesthetic and Image, Space, Comfort, Amenity, Serviceability, Safety, Operational Cost, Life-cycle Cost and Operational Management. Strategic value is an important criteria in business objectives while aesthetic and image create harmonious environment. Meanwhile, safety focuses on size and adequacy of space, that encourages social interaction and adaptability. Moreover, comfort enhances on environmental aspects which includes lighting, temperature and ventilation. Next, amenity emphasizes on service and equipment which includes completeness and provision of social amenities and adequacy of facilities (Isaac, 2009). For serviceability, it covers criteria such as cleaning work and routine maintenance. Furthermore, safety is an important criteria in design for access and space layout while operational cost enhance on energy cost. Then, the life cycle cost emphasize on cost of operating, replacement and maintenance for retaining and or restoring assets facilities and equipments to the specified operable condition. Finally, for operational management will covers criteria such as booking allocation system and user support for providing quality services and enhancing customer satisfaction (Preiser et al., 1988).

Egbu et al. (1996) defined refurbishment as rehabilitation, alteration, adaptation, extension, improvement, modernization, fitting out and repair work which is carried out on an

existing building to permit re-use for specific reasons. The demand for refurbishment projects can be classified into various categories such as corrective refurbishment, change in use, space alteration refurbishment, optimizing of economical factor as optimizing refurbishment, subjective features as pleasure refurbishment and change of environment. Ali, *et al.* (2009) pointed out that the aspect of technological, social, location, legal, aesthetic, image and environmental changes have contributed to buildings obsolescence. For instance, technological changes shorten the functional life of buildings at an increasing rate, which requires building modernization.

Refurbished listed public buildings in Kuala Lumpur

Based on Feilden in his Conservation of Historic Buildings (1994), the historical building has survived a century hazards of usefulness. In the past few years, many historical buildings have been preserved and conserved while others their functionality changed to bank, restaurant, information centre and offices. An inventory study undertaken in 1992 and 1993 by the Heritage Trust of Malaysia in conjunction with the National Museum, the Ministry of Housing and Local Government and Faculty of Built Environment, reveals that there are approximately 39000 numbers of listed historical buildings built between the year 1800 and 1948 throughout the country and classified as pre-war buildings (Idid, 1995).

Kuala Lumpur has had its share of modernisation and still retained its colourful cultural heritage and history. The buildings and sites is a physical legacy inherited from the different era of colonization. The importance of historical public buildings not only on its function as the past administrative institution, but also gives the picture of the lifestyle of past generation. Generally, the building deteriorated over time due to wear and tear.

3.0 Methodology

Based on study aims basically the research is based on questionnaires, semi structured interview and site case studies. It is divided into 3 stages as shown below:

4.0 Result and Analysis

The score for building performance were ranked from poor, good, very good and finally to excellent. The overall score for building performance observed is within good and very good scale. The most significant problems related to building performance criteria in areas of functional performance are space and comfort. The value of each performance criteria has been calculated based on Average Index method. Then, the correlation analysis shows that these two criteria have a very high correlation value as compared to other criteria. Meanwhile, the occupant's satisfaction and perception ranked from poor, good, very good and excellent. The value of each performance criteria has been calculated based on Average Index method. The overall satisfaction and perception of building occupants observed is within good and very good scale. As a result, all these criteria adhered to the occupant's satisfaction.

The analysis of Correlation was conducted using Kendall's tau Correlation Coefficient. It is a statistic used to measure the association between two measured quantities. The summary of correlation analysis between building performance and occupant's satisfaction and perception is presented as follows:

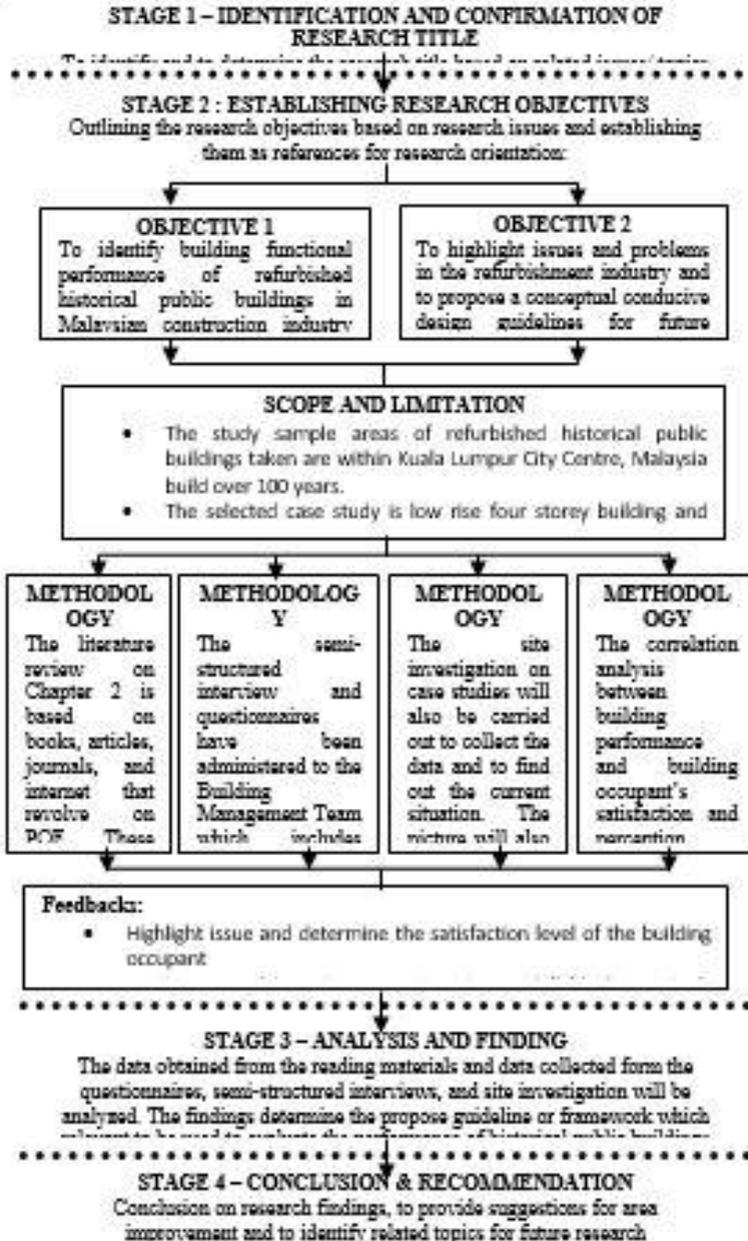


Table 1: Summary of Correlation Analysis between building performance and occupant's satisfaction

No	Criteria	Kendall's tau Correlation Coefficient			Average	Region
		"Excellent" if 0.80< Correlation Coefficients<1.00 "Very Good" if 0.65< Correlation Coefficients<0.80 "Good" if 0.60< Correlation Coefficients<0.65 "Poor" if 0.00< Correlation Coefficients<0.60				
		Building Management Team	User	Public		
1	Strategic value	0.400	0.454	0.427	0.427	Low Correlation
2	Aesthetic and Image value	0.807	0.735	0.637	0.726	High Correlation
3	Space	0.845	0.874	0.878	0.840	Very High Correlation
4	Comfort	0.867	0.840	0.817	0.841	Very High Correlation
5	Amenity	0.725	0.768	0.707	0.710	High Correlation
6	Serviceability	0.803	0.746	NA	0.825	Very High Correlation
7	Safety	0.825	0.776	0.776	0.817	Very High Correlation
8	Operational cost	0.619	NA	NA	0.619	High Correlation
9	Life cycle cost	0.607	NA	NA	0.607	High Correlation
10	Operational management	0.480	0.455	0.558	0.498	Low Correlation

(Source: Researcher, 2012)

In summary majority of the correlation coefficient for building performance criteria in areas of functional performance have very high correlation and high correlation with the correlation score for building occupant's satisfaction and perception. The correlations shows that 80% of the criteria or variables are in the region of very high correlation and high correlation between building performance and occupant's satisfaction scores.

Data collected from the seven (7) buildings were analyzed and presented in text as summaries. Semi-structured interview and surveys were also being carried out to obtain the details. The findings highlight the issues and problems based on POE conducted which presented as follow:

i) Strategic Value

The issue found is changes done to timber flooring after refurbishment works at Sultan Abdul Samad Building. It was found that the original timber floor finishes were replaced with modern floor finishes.

ii) Aesthetic and Image Value

Issue identified is mixed style of architecture. Refurbishment works changed the design originality. From the case study it was found that extension work done at the Kuala Lumpur railway station building effect the aesthetic and the originality of building's style and gothic architecture.

iii) Space

The issues found are weaknesses in space management planning in respective to end user needs. This should be address as highlighted by Khalil *et.al.*,(2008a). It needs a

comprehensive planning due to time constrain and high financial implication.

iv) Internal Comfort

From the finding it was found that internal comfort environment is not conducive with poor air condition performance. Study by Nur Khairul *et. al.*, (2009) found one of the main factor is due to aging of building.

v) Disable facilities

Facilities and amenities provided for disabled person after refurbishment works still need to be improve and not user friendly (Khalil *et.al.*,2008a) .

vi) Serviceability

Lacking in providing plan maintenance programme. Maintenance system is generally based on ad-hoc basis and generally difficult in determining the quality and maintenance work specification . The Limited access and working space to conduct maintenance works is another issue (Chohan *et. al.*,2008) and security services system is not adequate such as CCTV, electronic security access, locks, grills, telecommunication and night lighting (Khalil *et.al.*,2008b).

vii) Safety and security

Issues identified are non-compliance with local Authority requirement and lack of safety personnel training (Nur Khairul *et. al.*,2009). Training conducted only limited to selected officer or person in charge.

viii) Operational Cost

The issues found is the frequent cleaning, repair and maintenance for salt contamination and rising damp treatment. High salt concentrations in masonry walls cause extensive fretting and crumbling of the lower parts of walls (Ahmad *et. al.* ,1994). The treatment works need to be done frequently and this involve high cost. It involves cost to maintain and repair damages.

Proposed guideline / framework on building performance in areas of functional performance

The proposed guideline or framework is based on the research findings towards seven (7) case studies conducted. The level of correlation between building performance and building occupants' satisfaction determines the proposed guideline or framework which relevant to be used to evaluate the performance of historical public buildings in Malaysia in respective to functional performance. The criteria in Region A indicates a very high correlation while Region B indicates high correlation selected as criteria allocated in proposed guideline or framework which relevant to be used to evaluate the performance of historical public buildings in Malaysia. The proposed guideline or framework is depicted in Figure 2.

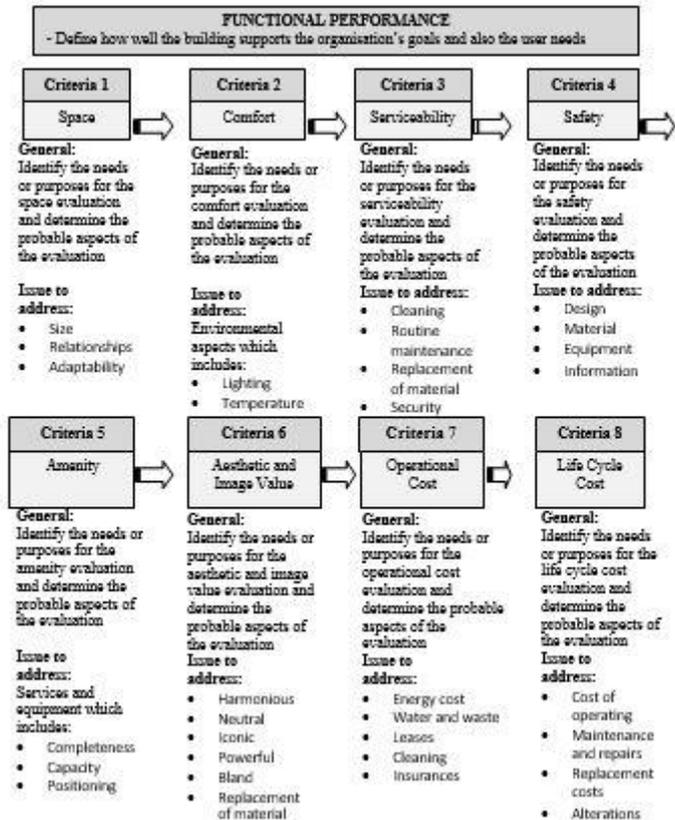


Figure 2: Proposed guideline on building performance in areas of functional performance

5.0 Conclusion and further research

Conclusion

In conclusion, POE is a comprehensive, hands-on process involving research but emphasizing on the on-site examination of one or a number of buildings. The research has concluded that POE provides a valuable approach in analyzing the performance of historical public buildings. Analysis and finding confirms the application of POE towards historical public buildings is relevant and effective to improve the building performance.

Based on the issues and problems arises from the case studies, it is recommended that the specific standard on the maintenance works carried out at the historical public buildings should be set up in order to produce good and uniform maintenance practices. The technical training should also be conducted by Department of National Heritage or any related parties

that involved in refurbishment projects for example contractor, consultant, private conservator and also individual. Finally, the consolidated law and comprehensive of refurbishment guidelines should also be enhanced.

Future research

- a) A Study on POE functional performance assessment to other building types of building such as hospital building, higher institutional building etc.
- b) To conduct POE on more globalised area and wider study samples.
- c) The focus of POE can be expanded in other area such as technical performance assessment.

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