Original Article

A framework for quality evaluation of university housing facilities

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Mohammad A. Hassanain

is Associate Professor of Architectural Engineering at King Fahd University of Petroleum and Minerals, Dhahran, Saudi Arabia. His research interests are in facilities engineering and management, sustainable development of buildings and infrastructure, facilities performance evaluation, and facilities fire safety management. He earned his PhD in Civil Engineering from the University of British Columbia, Canada in 2002.

Ahmed Sedky

was previously an assistant professor of Architecture at King Fahd University of Petroleum and Minerals, Dhahran, Saudi Arabia.

Zulfikar Aliyu Adamu

is a lecturer at the Architectural Engineering Department, King Fahd University of Petroleum and Minerals, Dhahran, Saudi Arabia.

Abdul-Wahid Saif

is Assistant Professor of Systems Engineering at King Fahd University of Petroleum and Minerals, Dhahran, Saudi Arabia.

Correspondence: Mohammad A. Hassanain, Architectural Engineering Department, King Fahd University of Petroleum and Minerals, PO Box 541, Dhahran 31261, Saudi Arabia
E-mail: mohhas@kfupm.edu.sa

ABSTRACT Campus housing facilities are a major investment for any institution. Accommodating staff and faculty within the premises of a university access to the work place for such special employees, but also establishes belonging, essential to retain high caliber staff within their institutions. However, this might sequence an adverse effect if the quality of place or quality of life of such facilities were compromised, as occupant's satisfaction of the quality of their housing can be directly linked to their work performance. This paper presents a framework for evaluating the quality of university family housing facilities. The framework entails carrying out a walkthrough investigation; conducting focused group meetings; interviewing the executives of campus maintenance and planning departments; developing and administering a questionnaire survey; conducting a public hearing session; analysing the data gathered from the above; and recommending a range of time-phased solutions for housing improvements. The framework has diversified its investigation techniques. It is capable of measuring the performance of a network of buildings rather than a single building. Most of the earlier Post Occupancy Evaluation studies concentrated on the level of single buildings.

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INTRODUCTION

Campus housing facilities are a major investment for any institution. The value of such investments might escalate to hundreds of millions of dollars, particularly in the case of staff and faculty housing in long-established universities. Accommodating the staff and faculty of such institutions within the premises of a university campus not only offers convenient access to the work place for such special employees, but also establishes a moral link and sense of belonging, essential to retain high caliber staff within their institutions. Such calibres are the actual investment for any institution. However, it might sequence an adverse effect if the quality of place or quality of life of such facilities were compromised, as occupant's satisfaction with the quality of their housing can be directly linked to their work performance. Hence, monitoring the condition of existing housing stock within any campus, as well as providing guidance for any new development, is essential to avoid such a compromise. This paper has the objective of presenting a framework for evaluating the quality of university family housing facilities. It serves as a protocol for housing administrators and facility managers, especially those seeking constant improvement of the quality in properties, and who deal with methods of defining the best interventions to better the quality of life within such facilities.

DEFINITION AND HISTORY OF POST OCCUPANCY EVALUATION

For the purpose of achieving the objective of this paper, the authors found it necessary to start the present inquiry from the point of the earlier set of Post Occupancy Evaluation (POE) initiatives. Preiser (1995) defines POE as 'the process of evaluating buildings in a systematic and rigorous manner after they have been built and occupied for some time'. POEs concentrate on building occupants or users and their requirements. They provide insights into the outcomes of past design decisions and the resulting building performance. The results obtained from POEs form a sound basis for improving existing buildings, and for designing, constructing and operating better buildings in the future.

In the 1960s, POE was known as 'environmental analyses' or 'building appraisals'. The early studies on POE took place when severe problems, some of which were attributable to the built-environment, were observed in institutional buildings. The scope of POEs at that time was limited to covering a minimal range of performance parameters such as perceived levels of daylight and adequacy of workspace and storage (Rabinowitz 1989). The 1970s witnessed a dramatic increase in the use of POEs, with the emergence of new knowledge about methods of evaluation, building types and occupant groups. By the end of the 1970s, the first books on POE were published, and attempts were made to define the field of POE as an appraisal of the degree to which a designed setting satisfies and supports explicit and implicit human needs, and to provide values of those for whom a building is designed. The 1980s produced a number of advances in theory, methods, strategies and applications for POE. POE has developed into a discipline of its own, with standardised terms and practitioner networks (Preiser *et al*, 1988). Since then, POE has been a fully fledged professional discipline counting on accumulating several sources of knowledge and experiences, developing these into a comprehensive discipline. It has developed into a professional career for specialised consultancy services for many design professionals.

POE was considered by Horgen and Sheridan (1996) as a formal way of determining whether a recently occupied element of built environment is performing as was intended in its programming and design. POE as defined by Baird (2001) is 'a generic term for a variety of general programs and procedures as well as specific techniques for the evaluation of existing buildings and facilities'.

In the United States, the tools and techniques used for data collection in POEs are based on comprehensive questionnaires in which occupants of the buildings are asked to give their feedback on the built environment (Horgen and Sheridan, 1996; Zagreus *et al.*, 2004). However, a somewhat different approach to evaluation of the built environment is the use of facilitated participatory workshops, as developed and widely used in Scandinavian countries. This favours dialogue and learning from best practice, and brings in local knowledge not only from the occupants, but also from the facilities service workers, seen as being valid input regarding space-planning and design.

PARAMETERS FOR EVALUATING HOUSING QUALITY

When assessing the state of any residential environment in terms of the physical quality of the environment as well as the services that support its users, Andrews (2001) purports that existing literature provides a set of evaluation parameters that includes environmental threats to human health; recreational amenities; and aesthetics of landscape and streetscape. Additionally, he pinpoints the fact that only environmental threats to human health have sufficient data series with accepted methodologies of intervention. Aesthetic characteristics of the built environment have no standard measurement indices, and rely on inconclusive factors such as property value and open space acreage.

QUALITY OF LIFE AND FACULTY HOUSING ON CAMPUSES

In a report on California State University titled 'Faculty Compensation and the Crisis in Recruiting and Retaining Faculty of High Quality', the California Postsecondary Education Commission, CPEC (2007) stated that competitive financial compensation is only one of the factors that faculty members consider when taking up or retaining job offers. Among the other factors that play a role in such decisions is quality of place. This report only supports the argument that quality of life has a direct bearing on people (especially housed employees), their sense of satisfaction and acceptance of the built environment, and this built environment can be assessed partly by measuring or assessing the quality of place parameters.

Another study on campus housing for faculty entitled 'Report on Faculty Housing and Affordability' by the Faculty Housing Committee (Ahn *et al.*, 2003) was conducted at the University of Southern California. In this report, the boundaries for quality of place and its impact on quality of life were extended further by including other auxiliary amenities such as availability and quality of schools for school aged children of faculty members. The report stated that these sorts of support services had a bearing on the perceived quality of life by a faculty member and any decision on whether to remain (or how long to remain) in the service of a university. They could be influenced by concerns such as quality of education for dependents. A key finding from this report is that the University of Southern California as an entity has been advised to take advantage of the development of urban districts of California in order for it to influence the outcome in a way that would be favourable for incoming (and existing) faculty members. Although not specifically mentioned, this could include provision of schools, which would benefit faculty members because of their proximity and quality. Additionally other social and relaxation outlets could holistically impact quality of life.

POINTS OF DEPARTURE

Most of the evaluative endeavours are trapped within the quantitative measures of performance for the indoor and outdoor environments. Therefore, most efforts succumb to this measure and only evaluate the quality of place, for example, degree of adequacy

of lighting, thermal comfort and so on. The quality of life within such facilities, though more comprehensive and responsible for the total satisfaction of the users, is frequently overlooked. Andrews (2001) postulated that there is a distinct barrier between quality of place and quality of life, and it is only unfortunate that those in charge of facilities' management and development misconstrue or substitute quality of place for quality of life. However, there is a direct link between quality of place and quality of life and in fact, quality of place may have greater impact on quality of life than previously acknowledged, the only snag being that people have different preferences in respect to places and environments. This inconsistency in perception affects the ability to link the measurable quality of place parameters with the perceived quality of life.

Review of the work of Carpenter and Oloufa, 1995; Tarricone, 1999; Zimmerman and Martin, 2001 suggests POE as the most prevalent paradigm for quality assessment of built environment available to date. However, POE has the limitation of being less responsive and perhaps not generic enough. It has developed as sets of template-like evaluation checklists in a range of accumulated literature since the 1980s.

Focusing more on the discussed typology of university housing facilities within controlled districts, a framework for evaluating quality of place is inevitable. It should be developed as a customised type of the more generic models of POEs as a methodological approach designed mainly for the discussed typology. Therefore, the sought POE framework should accumulate both technical and functional aspects related to quality of life, being comprehensive enough to incorporate users' preferences and address the quality of life of the evaluated facilities. Consequently, the sought framework presented in this paper, though similar in nature and purpose to the POE, will exceed POE in being responsively fashioned to complement the characteristics of any studied context, especially mass-housing facilities.

A FRAMEWORK FOR QUALITY EVALUATION OF UNIVERSITY HOUSING FACILITIES

The authors have devised an operational framework consisting of a diverse set of activities (processes), conducted to attain a systematic performance evaluation that concentrates on the users of the sought university housing facilities. The developed framework entails (1) carrying out a walkthrough investigation, (2) organising focused group meetings, (3) interviewing the executives of campus maintenance and planning departments, (4) developing and administering a questionnaire survey, (5) organising a public hearing session, (6) analysing the data gathered from the above, and (7) recommending a range of time-phased solutions for housing improvements. The framework processes are illustrated in Figure 1.

Walkthrough investigation

This starting activity focuses primarily on conducting a walkthrough investigation of the site, the housing district, to obtain a sense of the situation. It is a preliminary investigation to pinpoint the major problematic zones or elements by recording signs of deterioration of the outdoors. The investigation is documented with photos.

Focused-group meetings

This activity consists of one or more brainstorming sessions, serving as a tool to obtain an initial prescription of the degraded performance of the housing facilities and services of the district under review. The sample of participants would normally include a spectrum of dwellers representing different ranks, age groups and ethnicities. Such a sample would

Figure 1: General processes involved in the framework for quality evaluation of university family housing facilities.

qualify, though on a tentative basis, to observe, describe and criticise the encountered range of outdoor and indoor problems. In these sessions, participants would be asked to identify all types of problems they endure as dwellers in the above context. The outcomes of such an activity/activities are essential to guide the development of another investigation method: the questionnaire survey. The focus group meetings could also be held in parallel with the preceding activity, the walkthrough investigation, as well as the following activity, interviews with those in charge of maintenance and planning on campuses.

Interviews with the executives of campus maintenance and planning

This activity focuses on conducting interviews with the executives of the campus maintenance and planning departments, as they are major stakeholders in campus housing. They are responsible for the maintenance, execution and implementation of the maintenance and up-keep. The objectives of the interviews are to be guided by the experience of such a stakeholder who has encountered various arrays of housing maintenance and planning. These executives are a valuable archival resource for understanding the frequent complaints made by occupants. Nevertheless, it would be highly beneficial to conduct these interviews guided by the issues and concerns raised through the planned focus group sessions. This is to make sure that all issues are addressed during the in-depth interviews to be conducted with those in charge: executives.

Developing and administering a questionnaire survey

The objective of developing and administering the questionnaire survey is to obtain the residences' satisfaction rate with various categories of outdoor performance requirements (spatial configuration, parking, landscape, children's playground, outdoor support services and utilities, safety and security), as well as various categories of indoor performance requirements (housing unit layout, visual comfort, thermal comfort and indoor air quality, finish systems and furniture, indoor support services and utilities).

Table 1: Indicators of outdoor performance requirements

Outdoor performance requirements

Spatial configuration

01. Ease to identify the sub-zone where your housing unit is located.
02. Quality of road pavement and side-walks.
03. Quality of the outdoor image (exterior finish) of the housing unit.

Parking

04. Capacity of on-site car parking.
05. Design of on-site car parking space is efficient (roof, space arrangement).
06. Adequacy of artificial lighting levels in the car parking space.

Landscape

07. Quality and presentation of landscape around the housing units.
08. Availability of adequate sidewalks between the housing units.
09. Quality of open space design (green parks and walkways).
10. Adequacy of artificial lighting design in the outdoor spaces.

Children playground

11. Adequacy of children playground areas.
12. Design quality of children playground areas.
13. Adequacy of artificial lighting design in the children playground areas.

Support services/Utilities

14. Quality of sewage and drainage systems outdoor.
15. Cleanliness of the streets.
16. Efficiency of insect spray services.
17. Efficiency of garbage collection and cleanliness of their collection points.
18. Capacity of utility systems (sewage, electrical, water supply and gas).
19. Speed and efficiency of maintenance services for outdoor facilities.
20. Quality of landscape services for outdoor public areas (between units).
21. Quality of landscape services for private gardens (surrounding each unit).

Safety and security

22. Level of safety measures in children playground areas.
 23. Level of safety measures in outdoor areas.
 24. Level of safety measures in streets and walkways.
 25. Availability of emergency preparedness measures in outdoor planning.
 26. Enforcement of maximum speed limit rules.
 27. Quality of provided speed pumps.
 28. Quality of landscape design in facilitating safe driving.
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A number of performance indicators were developed to assess specific qualities and performances for each category of performance requirement. Tables 1 and 2 illustrate a comprehensive list of identified indicators. Room for extended and free expressions in an open-ended section would be provided at the end of the survey questionnaire. It is designed to encourage the respondents to comment on whatever issue/point that was not covered in the listed questions. However, the outcomes of such an open-ended section will be analysed separately due to its qualitative nature, which is different from the quantitative analysis to be applied to the outcome of the listed questions in the survey questionnaire.

Conducting a public hearing session

The objective of the public hearing session is to evoke the community to express their further concerns and main complains, by double checking the dimensions already pinpointed in the survey or the open-ended question report or by raising additional issues. The whole event should be documented audio-visually, to grasp all the verbal and non-verbal impulses and expressions for reliable qualitative interpretations.

Table 2: Indicators of indoor performance requirements*Indoor performance requirements**Housing unit layout*

29. Appropriateness of the number of rooms to your standards of living.
30. Amount of guest reception/family-living space.
31. Amount of bedroom space.
32. Amount of bathroom space.
33. Amount of kitchen space.
34. Amount of storage space.
35. Amount of corridor space.
36. Suitability of the location of bathrooms relative to guest reception area.
37. Number of bathrooms per housing unit.
38. Adequacy of opening design (windows and doors).

Visual comfort

39. Adequacy of natural lighting reaching bedrooms.
40. Adequacy of natural lighting reaching kitchen.
41. Adequacy of natural lighting reaching corridors.
42. Adequacy of natural lighting reaching guest reception/family-living space.
43. Adequacy of artificial lighting in all indoor space.

Thermal comfort and indoor air quality

44. Level of control of temperature in all rooms within the unit.
45. Capability of cooling systems to provide comfortable temperature in summers.
46. Capability of heating systems to provide comfortable temperature in winters.
47. Quality of air inside the guest reception/family-living space.
48. Quality of air inside the bedroom space.
49. Quality of air inside the bathroom space.
50. Quality of air inside the kitchen space.
51. Quality of air in the corridor.
52. Quality of conditioned air (HVAC) throughout the housing unit.

Finish systems and furniture

53. Quality and presentation of the exterior wall finishing.
54. Quality and presentation of the interior finishes of the rooms.
55. Quality and presentation of the interior finishes of the kitchen.
56. Quality and presentation of the interior finishes of the bathroom.
57. Quality of the indoor image of the housing unit.
58. Quality of carpentry work for doors and windows.
59. Quality of carpentry work for the kitchen cabinets.
60. Quality of carpentry work for the bathroom cabinets.
61. Quality of carpentry work for closets (wardrobe).
62. Quality of provided furniture.

Support services/Utilities

63. Availability and quality of drinking water.
64. Adequacy of number and suitability of locations of 110V power sockets.
65. Adequacy of number and suitability of locations of 220V power sockets.
66. Quality and capacity of provided refrigerator.
67. Quality and capacity of stove, oven and kitchen exhaust vent.
68. Quality and capacity of washing machine.
69. Speed and efficiency of maintenance services for indoor facilities.
70. Speed and efficiency of housing services for indoor facilities.

Data analysis

This activity entails analysing and triangulating two types of obtained data: quantitative and qualitative. The quantitative data emerge from the checklist of the walkthrough analysis and the output obtained from the statistical analysis of the questionnaire survey. The qualitative data emerge from the concerns expressed through the focused group meetings and the executives of the maintenance and planning departments, open-ended section in the questionnaire survey and the public hearing session, in addition to the environmental cues observed through the walkthrough technique.

Recommending a range of time-phased solutions for housing improvements

Triangulating the outcomes of the above different investigation techniques would increase the inner validity of such outcomes, and facilitates interpreting them. This is essential to define the most frequent problematic dimensions to be able to prescribe a range of time-phased housing improvement solutions, and short-term, medium-term and long-term solutions.

While the above developed framework draws from previous work by Preiser (1995), followed also by many researchers adopting the same mechanism and concept, it is significant in being more responsive to the sophisticated nature of the sought environment by addressing its different stakeholders as well as incorporating qualitative aspects, such as quality of life, shoulder to shoulder with the, frequently concentrated, quantitative aspects, for example, quality of place.

Moreover, as a model of investigation, it probes deeper than the conventional prefixed standards into level of efforts. The model presented in this paper is rather more generic, being free from specific reference to any level of efforts. It does not require the researcher to adopt a certain mechanism or to seek to flag certain classification. It does not look at conducting evaluation work of the quality of performance and life within a certain facility by being described as indicative, investigative or diagnostic. It can be just one of these, or a combination of more, depending upon the context dealt with and the situation, for example, availability of certain type of data, special condition of the site and so on.

CONCLUSIONS

The developed framework has diversified its investigation techniques, integrating community participation to ascertain the emerging outcomes and to define the most efficient and feasible interventions. The framework is capable of measuring the performance of a network of buildings rather than a single building, whereas most of the earlier POE work concentrated on the level of single buildings. Moreover, the developed framework has not mainly focused on the outcomes of the survey questionnaire as have most of the previous POE efforts. It employs the survey questionnaire as a preliminary investigative technique along with other investigation methods. In addition, the developed framework covers intangible aspects that impact the facility performance, such as the quality of planning and urban management. Furthermore, the present framework involved interacting with the community not only to measure their degree of satisfaction, but also to define the most needed but feasible solutions. It serves as a protocol for housing administrators and facility managers, especially those seeking constant improvement of the quality of life and place, in the type of the housing facilities dealt with.

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