

POST OCCUPANCY EVALUATION OF FACILITIES IN NIGERIAN PRIVATE UNIVERSITIES: A CASE STUDY

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Post occupancy evaluation has widely been used in assessing user needs of buildings in developed countries; however, it is rarely adopted by built environment professionals in Nigeria due to the dominance of reactive approach to maintenance. An investigative approach to post occupancy evaluation of facilities within the context of a Nigerian private university was explored. Data collection was based on a comprehensive survey through self-administered questionnaires in which users (students and staff) of the building were asked to report on their perceptions and experience of the facility and second data at organisational level was collected by personal interviews with the senior administration of the university. The survey Reports a case study carried out in respect of the College of Science and Technology (CST) building located at Covenant University in Ogun State, Nigeria. The application of this user satisfaction survey identified areas of deficiency in areas of maintenance and renovation.

Keywords: facilities, maintenance, Nigeria, private university, post occupancy evaluation.

INTRODUCTION

Importance of POEs has greatly increased in recent years, although it is a more typical activity in the USA and some European countries than it is in most developing countries. This phenomenon in third world countries can be attributed largely to the reactive maintenance “syndrome.” POE as defined by Baird (2001) is ‘a generic term for various general programs, procedures and specific techniques for the assessment of existing buildings and facilities. POE assesses how well buildings match users’ needs and identifies ways to improve building design, performance and fitness for purpose. It involves the systematic evaluation of opinion about buildings in use, from the viewpoint of the people that use them.

The major determinants of the type and depth of POE are the uses to which the information is to be put and the available resources (Preiser, Rabinowitz and White 1988). POE is recognised within the facilities management sector as a technique employed to aid benchmarking of the quality of services ranging from maintenance and cleaning to the provision of office furnishings (Wauters 2005). Wauters confirms the value of “user satisfaction surveys” as a herald to service level benchmarking and successive recommendations for improving facilities services.

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In Nigeria, facilities management practice is relatively new and was first used in the eighties by Chevron and Mobil as part of relocation activities of both Multinational companies. Today many organisations have realised that managing assets within traditional organisational structures are unsatisfactory, thus there is increasing demand for an integrated approach to management (Odiye 1998; Sani 1998).

The physical environment of universities should be catered for since their productivity depends on their facilities and supporting services and to improve performance of staff and students. The state of the physical estate of higher institutions is an indicator of strategic facilities management (Kotze & Nkado 2003). Successful implementation of Facilities management in Nigerian universities will influence strategic planning, development and policy decision-making that will improve their efficiency (Housley 1997; Asiabaka 2008). Private universities constitute 23 % of the country's higher education, and have the ability to expand with rapid population growth. The private sector contributes to the country's higher education system in providing quality education and allowing access for students who fail getting in public institutions. Given adequate regulations, private universities should, and can meet expected quality standards. (Mu'azu 2005).

In Nigeria, the demand for University education generally has skyrocketed; more universities are established by the Federal, State governments as well as private individuals and organisations, meanwhile facilities have been stretched to their limits. In most Universities traditional property management and maintenance is adopted, while concerned professionals have been hampered. The current maintenance practice in Nigerian universities is characterised by the following:

Insufficient qualified maintenance staff as well as shortage of other skilled craftsmen and technicians.

- Inadequate finance to off-set management expenses Example of bullet points
- In sufficient/lack of quality materials for replacement of faulty items in order to save cost
- Occupiers attitude towards the buildings they occupy
- Insufficient information or data

There is also the absence of a formal maintenance policy; the unplanned maintenance method is used (Asiabaka 2008)

There is little research done on POE in Nigeria especially with reference to the experience of private universities. POE studies are needed in Nigeria.

The paper is structured in the following manner. The present section has introduced the paper and defined the research problem. In the second section, literature is reviewed with respect to post occupancy evaluation of university buildings, benefits and barriers to POEs. In the third section the research methodology used and results of a questionnaire survey on satisfaction with facilities performance elements distributed to users of College and Science and technology building was discussed. The results of the survey were presented to identify aspects of the building that requires improvement. Then the conclusions are presented.

LITERATURE REVIEW: POST OCCUPANCY EVALUATION OF UNIVERSITY BUILDINGS

This section presents a review of a number of POEs conducted on university buildings worldwide over the years. Globally, many POE studies have been conducted with large number of benefits gained.

In the US, Horgen & Sheridan (1996) described post-occupancy evaluation and collected data using comprehensive questionnaires where occupants of the Taubman Building of Harvard University's School of Government, opened in 1990, were asked to report on their experience. Also, the use of facilitated participatory approach was used. The study showed that communication is a major factor for making a workplace successful, all stakeholders are crucial to building evaluations; also an evaluation of existing work environment should be seen as an integral part of any construction or remodelling project.

Leifer (1998) in examining user satisfaction of an office building in Australia described how POE can be used benchmarking. The performance of four of University of Auckland's office accommodation buildings were benchmarked using user satisfaction results of the office building.

In the case of a POE conducted in the UK by Wood & Worthing (1996) on a University of West England building to review the operation of the building, addressed the level of complaint of users using focus groups, expert walk-throughs and questionnaires. Issues raised from the study include lack of benchmark standards, weighting of opinions, measurement of quality and implementing organisational change. Another similar example is that conducted by Amarantuga & Baldry (1999) on the centenary building at the University of Salford. The two cases show that the conduct of POEs in assessing building performance has a long way to go before it can be promoted as an integral part of management practice. This appears to be the state in Nigeria.

A recent investigative POE study by Van der Voort & Van der Klooster (2008) on a new building in Avans Hogeschool (a Dutch Institute of Higher Education), Netherlands that accommodates previously dispersed departments showed that the move of previous departments to the new block was taken as an opportunity to introduce new workplace strategies with desk-sharing and desk-rotating in a transparent setting. Employees were found to be satisfied with the modern architecture, the advanced IT facilities and the openness of the building that supports communication and social interaction. However, many complained of a lack of privacy, conditions that hampered concentration on one's work and insufficient facilitation of the interaction between teachers and students. This helps in appreciating the benefits of POEs for new office moves within a European context.

In the Middle-East, some POE studies have shown to be beneficial and sometimes can establish that a building can no longer deliver an acceptable level of performance signifying the need to take an action such as demolishing the building and constructing a new one or changing the function of the old one. Gabr and Al-Sallal (2003) documented the severe deficiencies presented by the design of a building used as one of the educational facilities in a college of engineering, UAE. Performance criteria needed to run the educational system properly were missing. Functional spaces were lacking, environmental conditions were unhealthy and building condition was

deteriorating. The university officials later took the decision to build a new facility to overcome all these problems.

In recent times the conduct of POEs in the developed world aids in evaluating environmental performance of buildings. Hassanain (2007) carried out an indicative assessment of the existing indoor environmental qualities (i.e. thermal, acoustical, visual comfort and indoor air quality) of student housing facility at the campus of King Fahd University of Petroleum and Minerals, Dhahran, Saudi Arabia. A user satisfaction survey was developed to obtain the students' qualitative feedback on their experience with the designed indoor environment. The study found that the student residents were satisfied with the five main performance categories identified.

In summary, a review of POE studies presented in this paper show that there is little research done on this in Nigeria especially with reference to the experience of private universities. Lots of POE studies are needed in Nigeria.

Benefits and barriers to POE

Benefits of POEs are at different stages of occupancy, from initial occupation, to an annual review, or prior to a move; for all four stakeholder groups: clients, end-users, facilities managers and project team (Jaunzens *et al.* 2003). The benefits of a POE are directly comparative to the extent of the investigation performed. Preiser *et al.* (1988) indicated that POEs in general have a number of benefits and include:

- immediate identification of problems in buildings and solutions to them
- improved space utilisation and feedback on building performance
- improved attitude of building occupants through active involvement in the evaluation process; and
- informed decision-making and better understanding of the consequences of design
- significant cost savings in the building process and throughout the building's lifecycle; and
- accountability for building performance by design professionals and owners (Horgen and Sheridan 1996; Fisk 2001).
- improvements in the building performance
- improvement of design databases, standards, criteria and guidance literature; and

Barriers to POEs are posed by ownership of cost as to who to shoulder the responsibility of paying for it, misinterpretations of purpose as well as timing of surveys because it can show deficiencies within buildings and working environments. (Turpin-Brooks & Viccars 2006).

Research Methodology

An investigative approach to POE which provides an in-depth study of the building's performance and solutions to problems was used to measure building occupants' experience in the workplace. POE deals with analysis of individual buildings which can then be benchmarked when reliable and thorough approaches are used to collect data. Case studies ensure that POEs provide a greater depth of qualitative and quantitative data and a contextual background to the environment of building users (see Yin 1994, Amaratunga & Baldry 1999; Turpin-Brooks & Viccars 2006).

Data collection methods employed for the study include: an interview to obtain data at the organisational level with the director of maintenance. Also, questionnaires were

sent to gather individual level data through the responses of employees and students. Analysis of the study data is with the SPSS statistical package.

Pilot Case: College of Science and Technology (CST) Building, Covenant University

The case study is a building within the Covenant University, Ota, Ogun state, Nigeria known as the College of Science and Technology Building. Covenant University was selected because their maintenance strategies can be responsive to changes put forward by POEs when compared to public university buildings that are managed with bureaucratic procedures. The CST building is purpose built, and a three storey building measuring 11,980 square metres. In addition, the building comprises of 25 lecture rooms, 17 specialised Science/Engineering laboratories, state-of-the art computer laboratories and 45 single executive offices. Other spaces include 4 conference rooms, utility spaces and general conveniences. The building accommodates the departments of Estate Management, Architecture, Building, Computer Science, Physics, Chemistry, Mathematics and Biological sciences. The building was selected as a case study as it houses the greatest number of departments within the university.

RESEARCH FINDINGS

The user satisfaction survey instrument is a simple 29 question questionnaire completed by students and staff who were randomly selected in the building. The questions asked are shown in Tables 1a and 1b. A total of 142 questionnaires and 50 questionnaires were filled in and returned by students and staff respectively. This represents a response rate of about 71% and 100% respectively. In the questionnaire which is based on a 5 point Likert-scale, the respondents were asked to rate the importance of the physical work environment.

Interview results

Interview with the director of maintenance showed that there is a proper organisational structure in place. The director reports directly to the board of the university, the mechanical, electrical, building and estate units report to the director. This type of management structure allows ease for successful implementation of facilities management. The maintenance strategy adopted is usually reactive. Complaints are responded to via filled forms and phone calls. However, the maintenance unit is accessible to sufficient funds from the University and requests are made through written memos. Most of the services provided are in house. Also the maintenance staffs have access to state of the art maintenance tools such as computer soft wares. Although maintenance is user focused, the use of POE on the campus buildings will improve space utilisation and provide useful feedback on building performance through active involvement in the evaluation process of facility users and also provide informed decision-making and better understanding of the consequences of design.

Expectations of users

Although it is not easy to attend to the greater part of findings in a presentation, effort was made to address at least some of the main concerns. It is important to examine occupants' satisfaction with the physical environment. Table 1 summarises frequency counts and mean scores of some of the personal perceptions of the facility. The mean scores for each element range from 4.46 to 3.4 in the case of staff and it is 3.85 to 2.78 for students. The mean response for each of the performance elements was calculated using the SPSS package.

To be able to quantify the degree of satisfaction for each element of performance, the author used the following calculations:

- If the mean response is below 1.49, then the respondents are 'Neutral'.
- If the mean response is between 1.50 and 2.49, then the respondents are 'Strongly Dissatisfied'.
- If the mean response is between 2.50 and 3.49, then the respondents are 'Dissatisfied'.
- If the mean response is between 3.50 and 4.49, then the respondents are 'Satisfied'.
- If the mean response is between 4.50 and 5, then the respondents are 'Strongly Satisfied' (see Hassanain 2007)

The results shows satisfaction with cleanliness, lighting, comfort level, amount of space, noise level, organisational productivity, interior design, car parking, landscaping, air quality and ICT, among staff and students. Although provision of services such as archiving and telephone obtains a low value among students (2.96 and 2.94 mean scores), it has a high value among staff (4.10 and 4.10 mean scores). These results are similar to outcomes of previous studies. A previous study by Van der Voort & Van der Klooster (2008) on a new building in Netherlands showed that employees were found also satisfied with the modern architecture, IT facilities. However, many complained of a lack of privacy. Hassanain (2007) on the other hand found that users of a student housing facility were satisfied with noise level, ventilation, comfort level, lighting, and air quality. Communication which is a major factor in making a workplace successful (Horgen & Sheridan, 1996) was rated low by the users.

The results in Tables 1a and 1b below demonstrate that there is high satisfaction among staff since most of the respondents are not dissatisfied or strongly dissatisfied with services provided within the building. This is evidenced as shown in the table above in which spaces marked dissatisfied or strongly dissatisfied are left blank. The mean figures also confirm this as the mean scores vary between 4.46 to 3.4 showing that the staff respondents are satisfied with all the services, except for visual privacy in the work space with 3.4 mean score. The student respondents were also not satisfied with visual privacy in their classes (3.06 mean score). The problem with lack of visual privacy in the building is found when occupants find it difficult to concentrate on their work especially when their activities are monitored.

The aspects of the work environment viewed to provide the most satisfaction to students were: level of cleanliness (3.84 mean score; 34% strongly satisfied and 48% satisfied) natural lighting (3.82 mean score; 35% strongly satisfied and 45% satisfied), lighting in corridors (3.75 mean score; 32% strongly satisfied and 38% satisfied), artificial lighting (3.66 mean score; 31% strongly satisfied and 43% satisfied), air quality (3.60 mean score; 25% strongly satisfied and 49% satisfied).

The students as well as the maintenance department confirmed that the building is always kept clean by the campus cleaners. Lighting is adequately provided through the presence of wide windows as well as artificial fluorescent lights.

Most of the staff respondents rated landscaping (4.46 mean score; 29% strongly satisfied and 47% satisfied), car parking (4.44 mean score; 18% strongly satisfied and 46% satisfied), these aspects are important to lecturers because most of them own vehicles and use the car park compared to students who are not allowed to bring cars to the campus, hence are in a better position to assess these facilities.

Table 1a: Result of Survey from Occupants

No	Performance Elements	Students' Responses (%)					Staff Responses (%)					Mean Stud	Mean Staff
		S	S	N	D	SD	S	S	N	D	S		
1	Level of cleanliness	34	48	15	2	1	36	52	6	6	-	3.85	4.12
2	Adequacy of natural lighting	35	45	16	3	1	49	45	6	-	-	3.82	4.30
3	Control of artificial lighting	31	43	19	5	2	20	67	6	6	-	3.66	3.96
4	Adequacy of lighting levels in the corridors	32	38	23	7	0	24	62	14	-	-	3.75	3.92
5	Overall perception of lighting quality	29	51	15	3	2	38	62	-	-	-	3.88	4.38
6	Room temp during dry season	9	31	28	26	6	34	62	2	2	-	2.87	4.26
7	Room temp during rainy season	12	41	31	13	3	30	56	6	2	6	3.00	3.98
8	Overall perception of temp in building	13	37	32	14	4	14	84	2	-	-	2.94	4.12
9	Air quality within building	21	39	27	9	4	32	62	6	-	-	3.21	4.14
10	Air quality in the corridors	25	49	18	7	1	28	60	12	-	-	3.60	3.92
11	Control of natural ventilation	20	50	23	5	2	30	50	18	2	-	3.41	3.74
12	Overall perception of indoor air quality	16	49	25	8	2	42	52	6	-	-	3.32	4.24
13	Noise from air conditioning	23	39	32	3	3	36	44	12	8	-	3.19	3.92
14	Noise from outside the building	24	40	26	6	4	24	50	24	2	-	3.29	3.50
15	Overall perception of noise in the building	16	44	27	9	4	23	75	2	-	-	3.19	4.21
16	Overall comfort level	25	42	23	6	4	30	64	6	-	-	3.41	4.12
17	Furniture arrangement	18	43	25	9	5	28	72	-	-	-	3.24	4.28
18	Amount of space	18	37	24	16	5	28	60	6	6	-	3.21	4.04
19	Informal meeting space	16	26	37	16	5	28	46	14	12	-	2.78	3.74
20	Conversation privacy	16	36	39	6	3	36	42	20	2	-	2.86	3.74
21	Visual privacy in work space	18	37	32	10	3	18	56	26	-	-	3.06	3.40
22	Archiving and storage	16	37	35	8	4	28	66	6	-	-	2.96	4.10
23	ICT and supporting systems	11	40	24	17	8	40	52	2	6	-	3.07	4.21
24	Interior design appearance	19	40	26	10	5	24	70	6	-	-	3.20	4.06
25	Telephone system	12	34	24	15	15	28	66	6	-	-	2.94	4.10
26	Overall satisfaction	13	51	32	2	2	18	82	-	-	-	3.11	4.18
27	Organisational productivity	14	53	27	3	3	22	72	6	-	-	3.24	4.04
28	Car parking	18	46	33	2	1	44	56	-	-	-	3.15	4.44
29	landscaping	29	47	22	0	2	46	54	-	-	-	3.59	4.46

SS = Strongly Satisfied; S = Satisfied; N = Neutral; D = Dissatisfied; and SD = Strongly Dissatisfied

A look at Tables 1a and 1b also show that quality of lighting (4.38 mean score; 29% strongly satisfied and 51% satisfied) and furniture arrangement (4.28 mean score; 18%

strongly satisfied and 43% satisfied) were rated higher than other services. Student respondents were not satisfied overall with facilities provided in the building as well as the productivity of the University (3.11 and 3.24 mean scores) while staff respondents were satisfied overall with facilities provided in the building as well as the productivity of the University (4.18 and 4.04 mean scores).

There was dissatisfaction from students about room temperature (2.94 mean score; 29% strongly satisfied and 47% satisfied), archiving (2.97 mean score; 16% strongly satisfied and 37.4% satisfied), telephone services (2.96 mean score; 12% strongly satisfied and 34.3% satisfied), conversation privacy (2.86 mean score; 16% strongly satisfied and 36% satisfied), and informal meeting spaces (2.78 mean score; 16% strongly satisfied and 26% satisfied). The problem with the room temperature is a source of concern to the respondents because most of their classes are cooled with ceiling fans, which is not as efficient as air-conditioning systems. Respondents are not pleased with the ease and access of communication as most of the telephone intercoms are found in lecturers' offices. There are hardly designated phones for students in the building. Student respondents also need wider and secured shelves for storage. The ICT and supporting systems were better rated by staff than students.

Extent to Which Staff and Students Share Views

The 29 variables highlighted in tables 1a and 1b are summarised into ten variables or performance criteria. They include: cleanliness, lighting, temperature, noise, space/arrangement, privacy, outdoor quality, organisational productivity and others. Table 2 below shows the result of relationships among staff and student responses. Due to the small sample size involved in the analysis of staff responses, the Spearman coefficient of correlation (non-parametric test) was chosen as it measures the strength of the linear relationship among the responses.

Table 2: Result of relationship among staff and students responses

	Cleanliness	Lighting	Temp	Noise	Space	Privacy	Others	Org. product	Outdoor Quality
Corr. Coeff.	r= .060	-0.026	-.224	-.30*	.050	.068	-.127	.005	-.171
Sig.(2 tailed)	p= (.679)	(.862)	(.134)	(.041)	(.733)	(.648)	(.399)	(.971)	(.244)

* Correlation is significant at the 0.05 level (2- tailed)

If value is close to 0 relationship is weak, if 0.5 relationships is fairly weak, if close to zero, they are not linearly related. A look at 2 therefore shows that all the 10 responses are not related since they are all close to zero. If the significance level is less than 0.05 then the correlation is significant. If the significance level is at least equal to 0.50 then the correlation is not significant. Hence a look at table 2 shows that correlation is significant with temperature (p= .134), Noise (p= .041 and r= -.30*), others (p= .399) and outdoor quality (p= .244).

CONCLUSIONS

An investigative assessment of the College of Science and Technology building of the Covenant University, Ota, Nigeria was carried out on a representative sample of users of the building. The study has determined the degree of satisfaction obtained for 29

identified performance elements. The extent of satisfaction was based on a questionnaire in which occupants of the buildings were asked to provide feedback on the physical work environment by marking their degree of satisfaction on 29 performance elements. The findings were further supplemented with an interview with the director of maintenance and staff. The results shows satisfaction with cleanliness, lighting, comfort level, amount of space, noise level, organisational productivity, interior design, car parking, landscaping, air quality and ICT, among staff and students which will enhance the performance of the building. There was dissatisfaction from students about room temperature (2.94 mean score), archiving (2.97 mean score), telephone services (2.96 mean score), conversation privacy (2.86 mean score), and informal meeting spaces (2.78 mean score). The use of POE should be encouraged among built environment professionals such as planners, design professionals, housing administrators and facility managers involved in the planning, design and operation of facilities in Nigeria for improved building performance. Although the results of the POE presented in this paper are limited to the sample building investigated, the study can be extended to any other facility at any university campus or commercial office, regardless of location.

REFERENCES

- Amarantuga D, and Baldry D (1996) Building performance evaluation in higher education properties: Towards a process model, *COBRA, RICS research* 45-56
- Asiabaka, I.P, (2008) The Need for Effective Facility Management in Schools in Nigeria *New York Science Journal*
- Baird, G. (2001) Post-occupancy evaluation and probe: a New Zealand perspective, *Building Research and Information*, **29**(6), 469-472.
- Fisk, D. (2001) Sustainable development and post-occupancy evaluation, *Building Research and Information*, **29**(6), 466-468.
- Gabr, H. & Al-Sallal, K. (2003). A Post-Occupancy evaluation of university educational buildings. In G. Moser, E. Pol, Y. Bernard, M. Bonnes, J. Corraliza & V.
- Gabr, H. (n.d). A Post-Occupancy evaluation of buildings as a necessary tool in sustainable building performance. Retrieved on March 16, 2009 from
- Hassanain, M.A, (2007) Post-occupancy indoor Environmental Quality Evaluation of Student Housing Facilities. *Architectural Engineering and Design Management*, **3**, 249-256.
- Horgen, T. and Sheridan, S., (1996) Post-occupancy evaluation of facilities: A participatory approach to programming and design, *Facilities*, **14**(7/8), 16-25.
- Housley, J (1997) Managing the estate in Higher education establishments *Facilities* **15**(3/4), 72-83
- Jaunzens, D., Grigg, P., Cohen, R., Watson, M. and Picton, E. (2003) Building performance feedback: getting started, *BRE Digest*, **478**, BRE, Watford.
- Kortze.M and Nkado.R, (2003) An Investigation into the use of Facility Management, In Institutions of Higher learning in South Africa, *In: CIDB 1st Postgraduate conference proceedings*, Port Elizabeth, South Africa.
- Leifer, D, 1998, Evaluating user satisfaction: case studies in Australasia *Facilities* **16**(5/6)138-142
- Odieta D.E (1998); Application of Facility Management in the Nigeria private and Public sectors. Paper presented at *28th NIESV annual conference*, Kano, 1998.

- Preiser, W.F.E., Rabinowitz, H.Z. and White, E.T. (1988), *Post-Occupancy Evaluation*, New York, Van Nostrand Reinhold.
- Sani.A.M. (1998), Emergent Trends in Facility Management. Paper presented at *NIESV, 28th annual conference* in Kano, 1998
- Turpin- Brooks, S and Vicars G (2006) The development of robust methods of post-occupancy evaluation *Facilities* **24**(5/6), 177-196
- Van der Voordt T.J and Van der Klooster W (2008) Post occupancy evaluation of a new office concept in an educational setting *CIB W70 International Conference in Facilities Management*, Herriot Watt University, Edinburgh, June 16-18th 2008
- Wauters, B. (2005) The added value of facilities management: benchmarking work processes, *Facilities*, **23**(3/4),142-51.
- Wood, S and Worthing, D, 1996, Post- occupancy evaluation of higher education buildings: a case study *The cutting edge 1996 RICS Research*
- Yin, R.K. (1994) *Case Study Research*. 2nd ed., Sage, London.