

POST OCUPANCY EVALUATION OF PUBLIC OFFICE BUILDINGS IN MINNA URBAN (CASE STUDY OF SOME SELECTED GOVERNMENT PROPRIETIES)

Ayoola A. Babatunde

Department of Estate Management, Federal University of Technology, Minna, Niger State, Nigeria.

Email: ayosoye@yahoo.com. Tel: 070 38354214

Since humans spend more than 90% of their lives inside constructed environments and reasonable percentage of their active time in productive activities in such environments like offices, it is fundamental to know how office environments support workers productivity and how best they are satisfied with these environments. Post Occupancy Evaluation therefore has long been recognised as a method of measuring the performance of a building in use as well as provide information for upgrading or improving existing facilities. It is against this background that this work examines post occupancy evaluation of public buildings in Minna, Nigeria. The primary method of data collection was an extensive questionnaire combined with physical observation of office environments. The study reveals that there is no significant relationship between quality of office environment and workers productivity. Finally, the study suggests the involvement of workers at design decisions that affect their offices for there to be an enabling environment and perfect job satisfaction by workers.

Keywords: Post Occupancy Evaluation, Office Environment, Workers productivity

1.0 INTRODUCTION

A building has a significant role in the life of man as it is one of man's basic necessities of life after food in the ranking of man's greatest wants. A building therefore is not just a aimless and nonfunctioning thing. Buildings were notable for the extent to which they were really open to the outside air, a system that could be described to as natural ventilation, but with technological developments, buildings are sealed tightly, air rearticulate within them, with people spending most of their time indoors with some estimates being that humans spend more than 90% of their lives inside constructed environments.(Iyagba, 2005). It follows that if humans spend most of their lives inside buildings, then it is fundermental to note how well buildings match users' needs, and identify ways to improve building design, performance and fitness for purpose.

Post Occupancy Evaluation(POE) is importantly to ensure that buildings are responsive to the changing needs of people who use them. In a business environment with constant change and routine evaluation in most areas of activity, Post Occupancy Evaluation highlights the importance of design to organisations' marketing, operations and other interests. Evolving law, market trends and information technology changes the activities of people and therefore the requirements of designs. Evolution of environmental ideals for changing ways of life and values is dependent on design practices clearly identifying these changes. Post Occupancy Evaluation provides the dialogue with building users about their ways of life, their values and their environmental ideals.(Watson, 1996).

Formal Post Occupancy Evaluation has its origin in the UK.(Preiser et al, 1988). POE in the 1960s and 1970s involved in individual case studies of public and student housing sector (Vischer,2002; Zimring, Rashid & Kampschroer,2000) in Britain, France, Canada and United States. It was then widespread to other facilities such as army barracks, hospitals, prisons, courthouses and hospital. By seeing the logical step and beneficiary results from POE, it was later applied to commercial real estate and office buildings by the mid of 1980s. Information from POE has been used by the public agencies in support of the design criteria.(Khalil and Husin, 2009). Its development however in most developing countries is yet to be pronounced. But the potentialities in countries like Nigeria, South Africa and Ghana to name a few with large population and urban settlements that require facilities to satisfy their commercial, residential, industrial and recreation needs should be canvassed.

Ironically, POE has suffered almost 40 years of continued neglect in Uk in a country it originated from.(Carthey, 2006 citing Cooper, 2001). However, in the last decade, that there has been renewed interest in POE fuelled by the emergence of facilities management as a major discipline in the procurement and management of buildings (Carthey, 2006 in Preiser, 1995; Baird, 1996; Cooper, 2001; Stanley, 2001).

This research work therefore sets out to investigate the effect of some selected public building office environment on the workers satisfaction and suggest essential feedback to inform existing or future actions for building designs.

1.1 PROBLEM STATEMENT

Without Post Occupancy Evaluation, the sustainability of buildings in occupation may only be assumed rather than measured. With increased emphasis on sustainable design technologies; comfort and functionality may be compromised which in turn may hinder steps toward sustainability.(Ayoola and Davies, 2006).

Khalil and Husin (2009) were also of the opinion that in our present-day, peoples' concern is about sustainable environment wherein building occupants seek to obtain comfort and efficiency in their office. They emphasized that occupants' demand is to have priority in terms of comfortability to use and utilize the facilities and services as it must be fit for purpose of user.

Therefore, in measuring building performance, there are three main elements that should concern the evaluator as identified by Wolfgang et al (1988) in Zubairu (2010). Technical elements which is concern with health, safety, stability and security aspects of building performance; Functional elements which has to do with occupants' ability to operate efficiently and effectively; as well as Behavioural elements which bother on psychological and social aspects of user satisfaction and general well-being.

Workers ability to operate efficiently and effectively forms the major research problem to which this work tends to provide solution.

In an attempt to analyse the main problems of job satisfaction by workers in Minna from the purview of office environment; the pertinent issues are- Is it that the existing working facilities are inadequate? Is it that space allocation are inadequate? What is the situation of supporting Infrastructure in public buildings? These are the research problems to which this work tends to provide solutions.

1.3 RESEARCH HYPOTHESIS

The hypothesis for this research is a Non-directional two tail hypothesis as stated below;

Ho – There is no significant relationship between the level of workers satisfaction and their working environment

H₁ - There is significant relationship between the level of workers satisfaction and their working environment

1.4 THEORETICAL FRAMEWORK

1.4.1 Post occupancy evaluation defined

There are a number of meanings of Post Occupancy Evaluation(POE), all generally in agreement with, and built round the key subject of the simple statement (Preiser *et al.*, 1988) that “post-occupancy evaluation (POE) is the process of evaluating buildings in a systematic and rigorous manner after they have been built and occupied for some time”. (Carthey, 2006). Vischer (2001) in Carthey (2006) also defines POE as any and all pursuits that stem from a concern in learning how a building functions once it is built, including if and how well it has met expectations.

POE has been defined by Zimring and Reizenstein (1980) in Khalil and Husin (2009) as examination of the effectiveness for human users of occupied design environment. Khalil and Husin (2009) added that Post Occupancy Evaluation (POE) is one of strategic implementation of analysis on building sustainability after occupancy.

For the purpose of this study POE was defined as ‘the systematic evaluation of public buildings or facilities’ assumed to occur some time after their occupation.

1.4.2 TYPES OF POST OCCUPANCY EVALUATION(POE)

Van Wagenberg (1989) in Zubairu (2010), identifies four (4) types of POE. They are:

- (a) Historical Evaluation: This is the most common type of POE. Here the aim is to evaluate the building in retrospect. Does the building serve its users effectively? The

evaluator has to reconstruct the objectives of the original designers and then determine whether the building actually fulfills these objectives.

- (b) Comparative Evaluation: Here two buildings are compared, one changed by some specific action and the other unchanged. Several measures after the change are taken simultaneously in the two buildings which were similar before the change. The differences in the effects are postulated to result from the change.
- (c) Longitudinal Evaluation: This is comparative in time. In this type of evaluation, the expected consequences on the building are clearly stated before a change is made and they are used as a yardstick to take baseline measures. After baseline measurement, an action is taken and the effects measured again. Then the outcomes of before and after the action are compared.
- (d) Quasi-experimental Evaluation: Measures in a control situation as well as in the experimental situation are taken before and after the intervention by the evaluator. True effects show up in differences of outcome before and after the action as well as in the difference in outcome of the experimental situation and the control situation after the action.

1.4.3 Levels of post occupancy evaluation

The types of POE that Preiser (1989) discusses in much of his work as emphasized by Carthey (2006) in Zubairu (2010) and Office Accommodation Management Framework (2009) have been developed to be useful in a range of applications ranging from the investigation of a specific building, through to use for evaluation of an overall program. The types of POE outline may be summarised as three main approaches:

- Indicative (wide ranging application) – This provides an indication of major failures and successes of a building's performance. This type of POE is usually covered within a short time varying from several hours to one or two days.
- Investigative (more detailed approach) – Often an investigative POE is conducted when an indicative POE has identified issues that require further investigation. An investigative POE is more time-consuming, more complicated and requires more resources than an indicative POE. The major steps in conducting an investigative POE are identical to those in an indicative POE,

however the level of effort is higher. Much more time is spent on the site and more sophisticated data collection techniques are used.

- Diagnostic (extremely detailed and focussed study) – This is a comprehensive and in-depth investigation conducted with a very high level of effort. It generally employs a multi-method strategy including questionnaires, surveys, observations, interviews and physical measurements. The diagnostic POE may take from several months to one year or longer to complete. Its results and recommendations are long-term oriented aiming to improve not only a particular facility, but also the state of the art in a given building type.

1.4.4 Functions of post occupancy evaluation

Zimring et al (2010) citing DGS (2003) stated that the goals of the Post Occupancy Evaluation include;

- To better understanding the impact of early design delivery decisions on long-term efficiency and effectiveness of buildings, and
- To better understanding the impact of building delivery processes and decisions on customer response both initially and over the life cycle of the building.

Baird et al (1996) in Carthey (2006), notes the benefits of evaluation, which suggest a range of purposes for carrying out a POE which include;

- Better matching of demand and supply
- Improved productivity within the workplace
- Minimization of occupancy costs
- Increased user satisfaction
- Certainty of management and design decision making
- Higher returns on investment in buildings and people.

Carthey (2006) emphasized that most critics appear to be in general accord that Post Occupancy Evaluation is an integral component of the building procurement process, (Marans, 1984; RIBA, 1991; Shepley, 1997; Duffy, 1998; 2001; MARU, 2001; Zimmerman and Martin, 2001; Preiser, 2002) and that evaluation of buildings in-use must provide essential feedback to inform future actions.

Carthey (2006) citing Vischer (2001, p.23) notes that POE may be conducted for a range of purposes and reasons. She considers the main reasons for conducting them that include initiation as “research (Marans and Sprecklemayer, 1981), as case studies of specific situations, (Brill *et al.*, 1985) and to meet an institutional need for useful feedback on building and building-related activities (Farbstein and Kantrowitz, 1989). For some public agencies ... POE is a mechanism for linking feedback on newly built buildings with pre-design decision-making; the goal is to make improvements in public building design, construction, and delivery.”

1.4.5 LITERATURE REVIEW

Post Occupancy Evaluation(POE) from the purview of this research work is the systematic evaluation of public buildings or facilities’ assumed to occur some time after their occupation. Khalil and Husin (2009) were of the opinion that POE are typically performed within 4 to 24 months following occupancy of a new or renovated facility and are performed only once for an individual building. However, Watson (2003) in his opinion states that POE can be conducted at any time in the life of a building and it is not necessary to say that it should be conducted in between any time frame.

A POE study conducted by Ayoola and Davies (2006) the area of space required and the area of space available in the Nigerian Television Authority (NTA) Complex in Minna revealed that there is statistically significant difference in the area of space required and the area of space available to staff in the complex. The study suggested amongst others that allocation of workplace to the staff should primarily follow the nature of their jobs and assignment and not to be based on positions and ranks. This work though is empirical has only taken into consideration space requirement as a variable of work environments for workers.

Another study conducted by Khalil and Husin (2009) at the golden triangle area in Kuala Lumpur is purposely to determine occupants’ satisfaction and perception level in their office building in terms of indoor environment using level of cleanliness, visual comfort, thermal comfort, air movement and noise pollution. The study has shown that majority (much decreased - 40%; decreased – 47%) of the respondents indicated that their work productivity is affected due

to poor indoor environments. Improved cooling system, better visual comfort(day lightings) and indoor air movement and ventilation were suggested as ways to mitigate the problems associated with indoor environment in office buildings. This work, however has not been able to show statistically the relationship between work productivity and indoor environment of the occupants.

2.0 RESEARCH METHODOLOGY AND DATA COLLECTION

Majority of the public (government) buildings in Minna are situated within Chanchaga local government area. Five (5) federal government buildings, Seven (7) state government buildings and Two (2) local government buildings have been selected for this research work via simple random sampling technique. This work examines the functional elements of building performance which is concerned with occupants' ability to operate efficiently and effectively within their office workplace.

The data for this research is mainly primary in nature. A total of 400 questionnaires were retrieved from the 510 administered questionnaires on the workers across the 14 public buildings. Data as diverse as the level of workers satisfaction, state/condition of working facilities, availability of clinic, sources of electricity and the allocation of work place were extracted from this four hundred (400) workers in the fourteen (14) government owned parastatals and agencies in Minna, Niger State. A descriptive statistics of the variables for this research is as shown in Table 1.

Table 1: Summary of Descriptive Statistics of the Variables

Public Buildings	Level of satisfaction	Space Allocation	State of working facilities	Source of water Supply	Source of electricity	Availability of Clinics
Niger State Water Board	4.50	0.00	3.60	1	1	1
National Library of Nigeria, Minna	4.50	6.00	3.60	0	1	0
Niger state judiciary	7.75	10.00	5.80	1	1	1
Niger state development company	3.75	4.00	2.40	1	1	0
Federal road safety, Minna	7.50	0.00	6.00	1	1	0
Niger state Housing corporation	3.75	0.00	3.00	0	1	1
Magistrate Court, Minna	9.00	0.00	7.20	1	1	1
National Drug Law Enforcement Agency, Minna	3.75	0.00	3.00	1	1	0
Niger State Transport Authority	7.75	10.67	6.20	1	1	1
Chanchaga Local Government Secetariat	12.00	16.00	9.60	0	1	1
Niger State Library, Minna	3.25	4.00	2.60	0	1	1
Federal government secretariat	20.00	0.00	5.40	1	1	0
Nigerian Postal Services, Minna	8.00	7.00	6.60	0	1	1
Zonal Directorate for Education	4.50	6.00	3.60	0	1	0

*Source of electricity equals to 1 if from PHCN, otherwise 0

Source of water supply equals to 1 if from Niger state water board, otherwise 0

Availability of clinics equals 1 if nearby, otherwise 0

Variables such as the level of satisfaction, space allocation and state of working facilities were derived from workers perception and composite ranking of the variables to arrive at their mean values. Conversely, variables such as source of electricity, water supply and availability of clinics take a dichotomous form.

In this research, simple backward multiple regression model is employed to determine the relationship between the level of workers satisfaction and working environment using space allocation, state of working facilities, source of water supply and availability of clinics as proxies. The results of the research is presented in the subsequent section.

3.0 FINDINGS/ANALYSIS

3.1 Working Facilities

Computer, Intercom and Internet constitute the major working facilities available across the sampled public buildings. The responses revealed a high score of 55.75% on workers view of the availability of computer and on the other hand internet facility earned a low score of 19.75% on the availability of internet facility showing that internet facilities are retrofitted. From the response also, it is clear that the score for the adequacy of working facilities across the sampled public buildings by workers were dwindling with 9.5% as excellent, 24.75% very good, 32% good, 21.25% fair and 12.25% poor. As to how best the working facilities enhance performance of workers, 37.25% of the workers said their productivity had improved by the use of working facilities, 48% indicated that their productivity is fairly enhanced and 14.75% perceived a no effect of the working facilities.

3.2 Source of Water Supply

There is no plant and animal that can survive without water. The need for water in office buildings is very fundamental. 58.25% of the workers said water board is the source of their water supply, 27.5% for water Vendor (Mai-ruwa), while both private borehole and well as sources of water accounted for 14.25%. This shows an average effort of government agency responsible for water supply in areas where the selected public buildings are situated. This revealed that a lot is to be done on provision of water supply via public mains. Rather disheartening to find out that reasonable percentage of the workers still depend on water vendors, private bore hole and well for sources of water.

3.3 Source of Electricity

Power Holding Company of Nigeria(PHCN) and genators are the main sources of electricity across the 14 public buildings sampled. 89.75% of the workers said that PHCN is their source of power, while 10.25% indicated that it was generator. 64.5% of the workers rated electricity from PHCN to be highly frequent as they have light everyday. 28.75% rated the frequency to be several days a week, 5.5% rated the frequency to be once a week while 1.25% were highly dissatisfied with the level of electricity supply by PHCN as this percentage hardly have light. It has been observed that the state of electricity in the country as a whole is receiving attention.

3.4 Availability of Social Infrastructure

The availability of clinics around the sampled public buildings is our pre-occupation here. 43.25% of the workers said clinics are available in close proximity while 56.75% said clinics are not available nearby. In essence, workers that fall in the latter category in cases of feverish systems will have to leave their offices and in most cases go afar to take care of themselves.

3.5 Space allocation

Space management ensures that the quantity and quality of space in a building or buildings meet up to an established standard, so that it is supportive to the changing demands of the organisation through time in a cost effective way. The main issue that often arise with space allocation are the needs of flexibility and adaptability for different users. In this research, 41.25% of the workers rated space allocation to be adequate, 34% said it is inadequate and 24.75% were indecisive.

3.6 Level of satisfaction with office environment

19% of workers are highly satisfied with the office environment and 18.75% of workers dissatisfied. 28.75% of the workers sampled are satisfied with their office environment while 33.5% are fairly satisfied.

3.7 Relationship between level of workers satisfaction and their work environment

Tables 2 and 3 give the summary of the regression model and ANOVA indicate that P – value of 0.240 is greater than 0.05 level of significance, thus we reject the null hypothesis and accept the alternative hypothesis which states that there is no significant relationship between the level of workers satisfaction and their working environment.

Table 2: Summary of the Regression Model

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.653(a)	.426	.171	2.47610	.426	1.671	4	9	.240
2	.634(b)	.402	.223	2.39781	-.024	.378	1	9	.554
3	.620(c)	.385	.273	2.31855	-.017	.285	1	10	.605
4	.509(d)	.260	.198	2.43581	-.125	2.244	1	11	.162

a Predictors: (Constant), Availability of Clinics, Source of water supply, State of working facilities, Space Allocation

b Predictors: (Constant), Availability of Clinics, Source of water supply, Space Allocation

c Predictors: (Constant), Source of water supply, Space Allocation

d Predictors: (Constant), Source of water supply

e Dependent Variable: Level of Satisfaction

Table 3: ANOVA(e)

Mode		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	40.974	4	10.243	1.671	.240(a)
	Residual	55.180	9	6.131		
	Total	96.154	13			
2	Regression	38.659	3	12.886	2.241	.146(b)
	Residual	57.495	10	5.749		
	Total	96.154	13			
3	Regression	37.021	2	18.511	3.443	.069(c)
	Residual	59.133	11	5.376		
	Total	96.154	13			
4	Regression	24.956	1	24.956	4.206	.063(d)
	Residual	71.198	12	5.933		
	Total	96.154	13			

a Predictors: (Constant), Availability of Clinics, Source of water supply, State of working facilities, Space Allocation

b Predictors: (Constant), Availability of Clinics, Source of water supply, Space Allocation

c Predictors: (Constant), Source of water supply, Space Allocation

d Predictors: (Constant), Source of water supply

e Dependent Variable: Level of Satisfaction

Although, the four variables as seen in model 1 of regression model summary table account for 42.6% of the level of satisfaction among workers in the public buildings, these four variables are not significant predictors since P-value of 0.240 as shown in both the regression model summary table and ANOVA table is greater than 0.05 level significance. The unexplained factors can be attributed to other factors.

4.0 CONCLUSION/RECOMMENDATIONS

The results of this study have confirmed the relationship between the level of workers satisfaction and highlighted the interdependence of space allocation, state of working facilities, source of water supply, source of electricity supply and availability of clinics.

The feedback from workers would indicate that emphasis should also be placed on provision of unexplained factors such as wages/salaries and better social programmes as well as the involvement of workers at design decisions that affect their offices for there to be an enabling environment and perfect job satisfaction by workers.

If source of water supply and space allocation which contributed 38.5% of the variation in the level of workers satisfaction coupled with other factors such as wages/salaries as well as better social programmes, it is likely that the level of satisfaction and hence their productivity at work will be enhanced.

Building owners (local, state and federal governments) as a result of the findings of this research should know that attention needs to be directed at future upgrade of internet and water supply so as to ensure that these facilities are adequate and the reasonable expectations of workers are met. Also, clinical offices should be provided within public buildings for FIRST AID to workers.

The attention the power sector is receiving in the country at the moment is a right step in the right direction. However, efforts should be intensified by the federal government so that adequate power supply in all the states of the federation will be a dream come through.

Managers of government public buildings are encouraged to discuss office etiquette on a frequent basis at team meetings.

Finally, if these recommendations are put into actions by owners of public buildings, it is hoped that the building users in future will be empowered to comment on their built environment and commend appropriately. And as building designers have building users opinion in an appropriate

format, they can reduce guesses about what is important to occupants and the building owners will be able to adjust their practices to suit new buildings.

REFERENCES

- Ayoola, A.B and Davies, O.T (2006). Post Occupancy Evaluation of the Nigerian Television Authority, Minna, Niger State. Unpublished Thesis submitted to the Department of Estate Management, Federal University of Technology, Minna.
- Carthey, J (2006). Post Occupancy Evaluation: Development of a standardised Methodology for Australian Health Projects, *The International Journal of Construction Management*
- Department of General Services (2003). Facility Performance Evaluation, State of California.
- Khalil, N and Husin, H.N (2009). Post Occupancy Evaluation Towards Indoor Environment Improvement in Malaysia's Office Buildings. *Journal of Sustainable Development*, Vol.2, No.1
- Office Accomodation Management Framework (2009). Undertaking a Post Occupancy Review of Office Accomodation Projects.
- Preiser W.F.E., Rabinowitz H.R. and White E.T.(1988). *Post Occupation Evaluation*, Van Nostrand Reinhold Company, New York.
- Prieser, W.F.E (1999). *Post Occupancy Evaluation – Conceptual Basics, Benefits and Uses*. Van Nostrand Reinhold Press, New York.
- Watson, C.G (1996). *Evolving Environmental Ideas; Changing Ways of Life, Values and Design Practices*. A Paper for IAPS 14 Conference in Stockholm on July, 30.
- Zimring, C; Rashid, M & Kampschroer, K (2010). Facility Performance Evaluation. <http://www.wbdg.org/ccb/> ; <http://www.wbdg.org/index.php>
- Zubairu, (2010). Introduction to Facilities Management, Lecture notes for M.Tech Students, Federal University of Technology, Minna, Niger State, Nigeria.