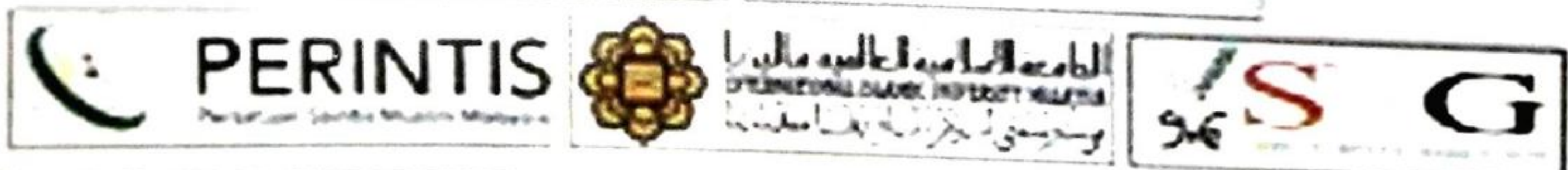


ICIST-2015

1st ICRIL-INTERNATIONAL
Conference
on Innovation in Science and Technology
20th April 2015

PROCEEDINGS

Organized By:



Post Occupancy Review of Building Engineering on some Selected Bank Buildings in Minna, Niger State, Nigeria

Akanmu, W. P¹, Ogunbode, E.B^{2*}, Bajere, P.A.¹, and Eboson, C. U.¹

¹Department of Building, School of Environmental Technology, Federal University of Technology, Minna, Niger State, Nigeria

²Department of Structures and Materials, Faculty of Civil Engineering, Universiti Teknologi Malaysia, Johor, Malaysia.

* corresponding author: ezekiologo@futa.edu.ng

Abstract

Although human comfort and safety is at the top of its agenda, Building Services profession has long struggled to link the soft science of human behaviour to the hard science of mechanical and electrical engineering. Yet a carried-out assessment covering a full-range of post-occupancy issues, compares performance-in-use with the original design objectives and the studies reveal how a building's comfort levels and speed of response may affect occupant satisfaction and productivity. A questionnaire well-structured was issued to obtain the various comfort by BSRIA's Environmental Code of practice and IAQ standard since an ultimate standard in comfort can never be achieved and coupled with some physical comfort index measurements carried out. The surveys never met the 85% of the occupant's satisfactory level for the bank building.

Keywords. Post occupancy evaluation; Productivity level; Thermal comfort, PROBE.

Introduction

Recently issues on designing a building that can supply its own energy as become one of the major challenges that building engineers tackle everyday in Nigeria. Building engineers are burdened with finding creative solutions to reduce energy consumption in the built environment to help combat global warming and improve quality of life. Though globally, increasing efforts are being made to studying the performance of occupied building in response to the quest of more efficient buildings to meet sustainability challenges [1].

Nigeria is a developing Nation with a vision to becoming one of the world's 20 largest economies by 2020 [3]. In pursuit to be such a developed country, The country has undergone unprecedented change in the last 15 years in terms of economic, social and environment [3]. This drive towards development has also created some challenges and issues on Building performance and occupant satisfaction. Buildings such as Banking structures experience heavy consumption of energy and engineering services in terms of electrical and mechanical daily in Nigeria, it has longer hours of occupancy than most other office buildings. All banks operate an intensive eight hour day. Most of these Bank Buildings are designed with poor provision for natural lighting and ventilation.

Energy is an important contribution to life and since life is also important to man, man's existence would not be complete without energy. Energy has then become an intricate part of a man. Man needs energy for his comfort either affecting him or his immediate environment. There are various ways energy contributes to comfort of man, but of the many technical challenges facing the comfort of human in the built environment this paper is looking at those considered paramount: Acoustics, Air quality, lighting and thermal comfort. These factors affect man's post occupancy comfort in a built environment and poses great threat to man's well-being and performance. Thorn [4] explains our discernment of the world is via our five senses of sight, hearing, smell, touch and taste. The factors of comfort are connected to

some of human important and external sense organs and since all these senses are contained in energy form energy is "life".

This paper carried-out assessment covering post-occupancy issues on some selected Banks in minna, Nigeria. It compares performance-in-use with the original design objectives and the studies reveal how bank building's comfort levels and speed of response affect occupant satisfaction and productivity in Nigeria.

Methods

Data were from both primary and secondary sources for analysis and presentation. The primary data was collected using a structured questionnaire obtained from the staffs using the Building of the selected banks in minna, Nigeria. A total number of 100 questionnaires was administered. The sampling method adopted is the simple random sampling in order to eliminate the incidence of bias. Secondary data were obtained from extensive literature review of relevant seminar paper, reports, textbook, journals and the use of internet, both published and unpublished which have all been of great benefit to this research. The descriptive statistical method of analysis was used on the data obtained. The perception of the employee would be properly examined by measuring their responses to certain questions regarding their comfort in the environment. This questionnaire contain some qualitative questions but structured to be responded within 10 minutes. Their responses would in percentile be checked on the benchmark for the performance of the various services. The causes, sources and its effects would be evaluated and a possible suggestion collected on its control would be considered for future improvement on design of such facility.

Results and Discussion

Table 1. Sources and causes of discomfort in the built environment.

Source/causes of discomfort	Visual	Sound	Air quality	Thermal
Air condition			✓	✓
Climate				✓
Computers		✓	✓	✓
Counting machines		✓		
Customers		✓	✓	✓
Daylighting	✓			
External				✓
Flash lights	✓			
Generator				✓
Internal				✓
Lack of extractors			✓	
Lighting	✓			
Photocopiers				✓
Poor power supply			✓	
Poor vent system			✓	
Staffs		✓		

Table 2. Respondent assessment of the bank Building services and management system.

Comfortable all day	Yes	No	
	15%	75%	
Period experienced Discomfort	9am-12noon	12noon-3pm	None
	30%	65%	5%
	Complaint format Available	Yes	No
	100%	0%	

Any complaint made	Yes	No		
	75%	25%		
Prompt response to complaint made	Yes	No		
	40%	60%		
Facility management Rating	Poor	Fair	Good	Excellent
	10%	74%	16%	0%
Improve level of comfort	Yes	No		
	87%	13%		
Area requiring Improvement	Visual	Sound	Air quality	Thermal
	24%	7%	3%	66%
Discomfort level	Visual	Sound	Air quality	Thermal
	60%	50%	60%	65%
Rating comfort	Poor	Fair	Good	Excellent
	16%	22%	60%	2

Table 3. Thermal comfort

Thermal environment	Cold	Average	Hot	None
Respondent rating (%)	15%	45%	35%	5%



Figure 1. Level of effect on Productivity

The Bank buildings comprised of several departments but centered on providing financial services to the public individuals. It is a commercial institute with an artificially controlled environment and the occupancy survey was perceived by the responses of the occupants based on their percentage of satisfaction gathered from the questionnaire.

The questionnaire was attempted by the sampled permanent staff sampled in the building except for the security officers and drivers who are relatively always at the external environment. Therefore, a survey of staff response to their comfort was examined using a structured questionnaire.

15% of the staff indicated that they spend less than 8hrs daily in the building, while 85% spent above 8hrs in the building effectively. 25% spent between 2-4hrs on desk on a daily basis and 25% spent more time on the desk between 4-8hrs on day to day activities. The bank operates for 5 working days in a week except for the services officers who work for more than 5 days. The result shows that just 10% have spent less than a year in their various bank building, 25% have had between 1-2 yrs experience in the building and 65% have been using the building facilities for more than 2 yrs. This shows that most workers have had at least a complete year seasonal cycle experience using the facility and can be precise about how they are affected by their comfort condition in the building.

If using benchmark to evaluate the overall perception of comfort it would certainly not be applicable to all environmental conditions especially as the British Standard CIBSE benchmarks are mainly suitable for British countries with similar weather condition but since it affects the human occupants according to ASHRAE in ICE it is wise and better to let the users judge the comfort as individuals opinion varies based on their individual metabolic rates, sociological and psychological perceptions alongside their environmental factors differs but the satisfaction should be of a minimum of 75% for satisfactory response.

Table 1 shows the Sources and causes of discomfort in the built environment as identified by the respondent. Table 2 shows that 50% experience sound discomfort and 50% don't, while 60% experience visual and 65% are discomforted by the thermal conditions. This shows the building is not satisfactory. 60% are also affected by the air quality, on thermal comfort; 45% on average condition, 35% for hot and 15% for very cold (see Table 3).

Figure 1 shows the productivity level, 90% says sound does not affect their productivity level, 60% is affected by visual effect, 60% is not by air quality and 55% is thermally affected. This shows that the sound is satisfactory for productivity. Just 75% said it is not comfortable all day but rather 65% discomfort is experienced between the periods of 12-3pm in the day.

Table 2 shows that the facility manager have set up a means for complains regarding any discomfort in the environment based on any facility's ineffectiveness but the responses from the occupants shows, 75% agree that a complaint format is provided, 75% says they have filed a complaint before regarding their discomfort out of that 60% said no prompt response was made and 40% are saying there was. The respondents noted that the management system of the electrical and mechanical services are fairly (74%) handled and with such level of discomfort 87% says there is need for improvement.

Conclusion

The outcome of the study describes the Building and Its engineering services performance. This serves as a feedback to help the designers and building engineers gain greater understanding of the implication of the features they want. The study showed that greater number of the occupants (building users) are not satisfied with the level of the acoustics, air quality, lighting and thermal comfort of the bank buildings evaluated. It is only by learning from the disappointment, short comings and successes from such a study like this, that the industry can improve Building performance and provide adequate satisfaction to the users, especially Banks.

References

- Saiful Hadi Mastor and Norhati Ibrahim. "Post Occupancy Evaluation Practices: A Procedural Model For A Successful Feedback". Proceedings of the CIB 2010 World Congress, Salford Quays, United Kingdom, 10-13 May, 2010.
- Mostafa, K. T. *Sustainable Development: Constraints and Opportunities*. Elsevier, 2013.
- Raffaello C., Riccardo V. and Monia S. *Toward Climate-Resilient Development in Nigeria*. World Bank Publications, 2013.
4. Thorn. "Lighting people and places". *www.thornlighting.com* Technical handbook. 2009.