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EVALUATION OF THE EFFECTIVENESS AND IMPACT OF BEHAVIOURAL PERFORMANCE ELEMENT IN SELECTED ACADEMIC LIBRARY BUILDINGS IN OGUN STATE

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Abstract
Post occupancy evaluation (POE) has become a management tool used to assess how buildings and facilities in tertiary educational institutions are serving the needs of their users. This study has examined the design features and architectural elements of selected academic library buildings in Ogun State, Nigeria. This is with regards to the effectiveness and impact of the behavioural performance element of the buildings. The study employed the quantitative approach using structured questionnaire tools that consisted of close ended questions to obtain relevant data. Analysis of the findings were done using descriptive and inferential statistical tools. Findings showed a direct influence of indicators of behavioural performance such as aesthetics, large functional interactive spaces and circulation routes on effectiveness and impact. The study recommended that academic library buildings should be aesthetically pleasing, encourage inclusivity with circulation spaces that are not isolated but interactive.
Keywords: post occupancy evaluation, tertiary education, buildings and facilities, performance element, academic library buildings

Introduction

Academic library buildings account for a significant portion of any tertiary education institution's assets and capital investments (Ojogwu & Alutu, 2009; Ugwuanyi *et al.,* 2011). In terms of physical planning and design, it is the heart of any tertiary educational institution and reflects the philosophy of the parent institution. Academic library buildings are constructed to support teaching, learning, and research, and they have a unique and symbolic physical position on campus due to their centrality while allowing movement to other important activity areas (Ugwuanyi *et al.,* 2011; Cunningham & Tabur, 2012; Erickson, 2000). Architectural expression, geographical location, orientation, and siting are important areas of prioritization that should adhere to the National Universities Commission (NUC) and other accreditation agencies' planning and design guidelines and standards in the tertiary institution's master plan. A standard academic library is expected to be conducive to reading and learning as well as accessible to those with disabilities. It is expected to provide easily accessible, clean, quiet, satisfying and comfortable environment (Ojogwu & Alutu, 2009; Shamaki, 2015). Library planning, design, construction and management can have significant impact on students' educational achievements (Isa & Yosuff, 2015).

Statement of The Research Problem

Despite the fact that literature studies have shown that comfort and satisfaction are the most important factors among other considerations necessary to motivate and improve usage of academic libraries among students and staff (Cunningham & Tabur, 2012; Shika *et al.,* 2013), literature is, however lacking on the appropriate strategies necessary to improve the effectiveness and impact of behavioural aspects of academic library buildings for improved satisfaction and comfort. After occupation, an academic library building may experience problems and deficiencies related to identified key performance elements, which may necessitate

extensive research to properly diagnose. This study intends to assess the effectiveness and impact of the behavioural performance of selected academic library buildings in the Ogun State. Many studies on academic library buildings have focused on the resources and services (collections) provided as well as how to improve them, whereas there is little or no literature in the study area on the evaluation of behavioural performance of academic library buildings (Gilbert, 2015; Ahmad *et al.,* 2021).

Objective of The Study

The main objective of the study is to assess the effectiveness and impact of behavioural performance element in selected academic library buildings in Ogun State. The specific objectives are to:

1. examine the socio-economic characteristics of the users of the selected academic library buildings in the study area
2. Identify the important indicators of behavioural performance in the selected academic library buildings in the study area
3. Assess user perception regarding the effectiveness and impact of behavioural performance in the selected academic library buildings in the study area

Literature Review

Buildings are critical to the operation of tertiary educational institutions on a daily basis (Amaratunga and Baldry, 2016 and Hassanain and Ibrahim, 2020). The condition of buildings and facilities in a learning environment can influence teacher and learner performance (Olatunji, 2013; Abisuga et al, 2019). Tertiary educational buildings are valuable assets, and the physical aspects of these important buildings must be evaluated from the perspectives of their users in order to determine the extent to which they satisfy intended usage and the degree to which they support the educational process of the institutions. Tertiary educational institutions are expected to build appropriately to improve performance and support their core mission of providing qualitative higher education that is globally competitive.

The academic library building serves as a hub of learning and research in an institution (Ugwuanyi, Okwor & Ezeji, 2011). According to Akporhonor (2005), library buildings are established for the conservation and dissemination of knowledge and information. This is the primary mission of academic libraries, in addition to assisting their parent institutions' missions of teaching and research. Shika, Sapri, Jibril & Sipan, (2013) and Ahmad, Shoaib & Shaukat (2021) argued that the purpose of setting up academic libraries in tertiary educational institutions is to meet the intellectual needs of the academic community. To achieve this goal, library buildings and facilities should be designed to meet the functional, technical, and behavioral requirements that affect the efficiency and productivity of their occupants. Ugwuanyi *et al.* (2011) went on to argue that it is necessary to understand how users feel about building spaces and act within them in order for the building to work better for users and for users to perform better within the building. (Amaratunga & Baldry, 2016; Ejoor *et al.,* 2021) have identified three major categories of performance elements relevant to academic library buildings as the technical, functional, and behavioral elements.

Purposes of post occupancy evaluation

According to Okolie (2011) and Tookaloo and Smith (2015), the purpose of post-occupancy evaluation of educational buildings is to improve efficiency and productivity. Post occupancy evaluation seek to greatly improve the quality of buildings and facilities in higher education institutions and other learning environments. POE literature (Amaratunga & Baldry, 2016; Ejoor *et al.,* 2021) have identified three major categories of performance elements relevant to academic library buildings: technical, functional, and behavioral elements. After occupation, an academic library building may experience problems and deficiencies related to these key performance elements, which necessitate extensive research to properly diagnose. Post-occupancy evaluation is critical for providing evidence-based insight into academic library building design and space planning. It will

also help to practically approach issues of user needs and expectations for improvement and avoid recurrence of failure in future designs of a similar building (Mustafa, 2017; Ejoor *et al.,* 2021). Post-occupancy evaluation is critical for providing evidence-based insight into academic library building design and space planning. It will also help to practically approach issues of user needs and expectations for improvement and avoid recurrence of failure in future designs of a similar building (Mustafa, 2017; Ejoor *et al.,* 2021).

Behavioural aspects of library buildings

The essence of built spaces is to sustain the occupants' psychological comfort and wellbeing, moreso, as more than 70% of a person's lifetime is spent indoors (Wahba et al. 2023). Studies have also shown that stimulating and exciting physical environment are important determinants of human behaviour. In library buildings, behavioural performance aspect attempts to create a connection between occupant's activities and the physical environment (Abisuga *et al.,* 2019). Scholars believed that people and human settings are inseparable components and that, settings can determine the display of satisfaction or dissatisfaction behaviour on the part of users of buildings or services (Bitner, 1990; Azila-Gbettor, Avorga, Danku & Atatsi, 2013, Hassanain *et al*, 2021).

Behavioural performance is also referred to as social interactions that are subjective and reflect individuality (Dursun & Ozsoy, 2008). In library studies, Mustafa (2017) described it to include the effect of area size and number of persons that share a space upon a building occupant and the effect of functional distance between spaces upon the frequency of use. Behavioural performance also includes factors of occupants' comfort and satisfaction as affected by spatial configuration of circulation routes and impact on social interaction and features that affect the building's image and outlook (Preiser *et al*., 2015). Behavioural aspects can have much influence on user perception with building performance and perceived service quality. The essence of behavioural science in architecture is the creation of environment that meets human needs and expectations. A previous study conducted by (Ahmad et al., 2021) has reported that the factor of behavioural performance can contribute to the patronage and non-patronage of academic libraries. For example, library building aesthetics and patronage were examined in a study conducted by Usuka et al. (2019) in South East Nigeria. The study recommended that library building aesthetics is important to patronage and should be considered in the planning and design of university library buildings. The study revealed that high quality aesthetic facilities are important to ensure long life span and sustainability. Library aesthetic features may include facades, lighting features, art works, interior and exterior decorative works. In his study, Oyedum (2011) established that reading environment must be attractive to encourage the use of library resources. This will also create positive user perception and promote frequent usage.

Methodology

The study employed a descriptive survey approach. The evaluation tool used for the assessments is a questionnaire survey. This is a survey technique that requires the users to complete structured questionnaire him/herself at the centre as a building user. According to Mustafa (2017), questionnaire surveys are recognized as a key component of any building performance evaluation study. The questionnaire was based on a five-point Likert scale for evaluating the level of effectiveness of the designed and occupied spaces in an academic library building. Where (VE) represents Very Effective, (E) represents Effective, (U) represents Undecided, (I) represents Ineffective and (VI) represents Very Ineffective. The respondents were asked to rate their agreement to different questions bothering on the impact and effectiveness of behavioural performance of the library buildings. This study has focused on the accredited public and private universities, polytechnics and colleges of education with purpose-built academic library facilities and located in Ogun State, Nigeria. Drawing from a population of 2730, a sample size of 553 representing 20.25% was obtained. The descriptive

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statistical tools employed in the study are simple distribution frequency table, percentage, relative effectiveness index (REI) and weighted mean score (WMS).

Data Analysis and Interpretation

Questionnaire distribution and response rate

Table 1 shows the questionnaire distribution and response rate. The response rate of 89.98% implies that the respondents demonstrated high level of willingness to participate in the study. Academic library buildings are important components of tertiary education and can impact students' academic performances.

Table1: Questionnaire Distribution and Response Rate

Institutions	Category	Questionnaire Administered	Questionnaire Retrieved	Valid Response	Response Rate (%)
	Federal	85	79	74	77.38
University	State	81	77	76	76.25
	Private	82	74	71	76.54
	Federal	80	75	73	78.75
Polytechnic	State	79	72	69	72.15
College of	Federal	75	71	67	88.00
Education	State	71	67	64	87.14
Total		**553**	**515**	**494**	**89.98**

Source: Researcher's Computation, 2023

Pattern of academic library usage

Table 2 shows the pattern of academic library usage by the respondents. Analysis showed 111 respondents representing 21.55% have used the library building for 1yr compared to 107 respondents representing 20.78% that have used the library for 2 yrs. 276 respondents representing 53.59% have used the library for about 3 yrs while 14 respondents representing 2.72% have used the library for about 4 yrs. Also, 7 respondents representing 1.36% have used the library for about 5 yrs and above. Analysis of frequency of use showed that 178 respondents representing 34.56% do visit the library daily compared to 144 respondents representing representing 27.96% that visit twice in a week. Also, 113 respondents representing 21.94% visit thrice in a week while 80 respondents representing 15.53% visit library on weekly basis. Analysis of preferred time of visit showed that 204 respondents representing 39.61% prefer to visit in the morning while 130 respondents representing 25.24% prefer to visit to visit by afternoon. 59 respondents representing 11.46% prefer to visit by afternoon. 59 respondents representing 11.46% prefer to visit the library by evening time compared to 122respondents representing 23.69% prefer to visit anytime of the day. Analysis of purpose of visit showed that 194 respondents representing 37.67% visit to study compared to 38 respondents representing 7.38% who visit to socialise. 116 respondents representing 22.53% visit to do school assignments. 73 respondents representing 14.18% prefer to visit to use computers while 82 respondents representing 15.92% visit to read books, magazines and other materials while only 12 respondents representing 2.33% visit the library for other purposes not captured in the study.

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Table 2: Pattern of Academic Library Usage in the Study Area.

Statement	Category	Frequency	Percentage (%)
Year(s) of using the school library	1 year	111	21.55
	2 years	107	20.77
	3 years	276	53.59
	4 years	14	2.72
	5 years and above	7	1.37
Frequent of using the school library	Daily	178	34.56
	Twice a week	144	27.96
	Thrice a week	113	21.94
	Weekly	80	15.53
	None	Nil	Nil
Preferred time of visiting the school library	Morning	204	39.61
	Afternoon	130	25.24
	Evening	59	11.46
	Anytime	122	23.69
Purpose of using the school library	Study	194	37.67
	Socialise	38	7.38
	Assignment	116	22.53
	Use of Computers	73	14.82
	Read books/magazines	82	15.92
	Others	12	2.33

Source: Researcher's Computation, 2023

Socio-Economic Characteristics of Respondents

As presented in Table 3, analysis of gender showed that 329 females representing 63.88% were available while 186 males representing 36.12% were in the library buildings. This indicated that more female patrons visit the library than male patrons. Analysis of age of respondents showed that 283 respondents representing 54.95% are less than 21 yrs of age while 137 respondents representing 26.60% are between the age ranges of 21 to 30 yrs. 74 respondents representing 14.37% are between 31 to 40yrs of age while 21 respondents representing 4.08% are above 40 yrs of age. This finding showed the relevance of academic library to all age group. Analysis of marital status showed that 511 respondents representing 99.22%were single while 4 respondents representing 0.78% were married. Analysis of educational qualifications showed that 316 respondents representing 61.36% possessed secondary school leaving certificate while 153 respondents representing 29.71% possessed the ordinary national diploma (OND) or the national certificate of education (NCE) certificates. 34 respondents representing 6.60% have the first-degree certificate or the higher national diploma (HND) certificates while 12 respondents representing 2.33% have the master's degree certificate. Analysis of employment status showed that 10 respondents representing 1,94% were academic staff while 483 respondents representing 93.79% were under graduates. 18 respondents representing 3.50% were post graduate students while 4 respondents representing 0.77% were visitors to the academic library buildings. Analysis on health conditions showed that 3 respondents representing 0.59% have eye sight challenges compared to 1 respondent representing 0.19% that has mobility challenge. 511 respondents representing 99.22% have no known physical challenges.

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Table 3: Socio-Economic Characteristics of Academic Library Users

Profile	Parameters	Frequency	Percentage (%)
Gender	Male	186	36.12
	Female	329	63.88
	Total	**515**	**100.00**
	< 21yrs	283	54.95
Age	21-30yrs	137	26.60
	31-40yrs	74	14.37
	> 40yrs	21	4.08
	Total	**515**	**100.00**
	Single	511	99.22
	Separated	Nil	Nil
Marital Status	Widow	Nil	Nil
	Married	4	0.78
	Divorced	Nil	Nil
	Total	**515**	**100.00**
	Primary	Nil	Nil
Highest	Secondary	316	61.36
Educational	OND/NCE	153	29.71
Qualification	B.Sc./HND	34	6.60
	MSc	12	2.33
	Ph.D	Nil	Nil
	Total	**515**	**100.00**
	Academic Staff	10	1.94
	Non-Academic Staff	Nil	Nil
	Undergraduate Student	483	93.79
Employment	Post-Graduate Student	18	3.50
	Visitor	4	0.77
	Total	**515**	**100.00**
	Academic Staff	10	1.94
	Non-Academic Staff	Nil	Nil
	Undergraduate Student	483	93.79
Health	Post-Graduate Student	18	3.50
Condition	Visitor	4	0.77
	Total	**515**	**100.00**

Source: Researcher's Computation, 2023

Indicators of Behavioural Performance

Effectiveness of behavioural performance in federal tertiary institutions in Ogun State

For the purpose of the study, six (6) indicators have been selected for ranking. In no particular order, these include social interaction among users and staff in the library building, density of functional spaces in the library building, library spaces in supporting different activities of categories of users, functional distance between activity spaces in the library, circulation routes in enhancing social interaction and image or outlook of the library building in attracting users.

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As shown in Table 4, the behavioural performance elements that exhibited a statistically significant impact on academic library in the tertiary institution in the study at the federal level were: Density of functional spaces in the library building (β: 0.332; p: 0.000), Functional distance between spaces (β: 0.215; p: 0.000) and Image/outlook of the library in attracting/welcoming users (β: 0.314; p: 0.032). Similar result was obtained for state tertiary institution having Density of functional spaces in the library building (β: 0.400; p: 0.000), Functional distance between spaces (β: 0.347; p: 0.003) and Image/outlook of the library in attracting/welcoming users (β: 0.426; p: 0.027) with a statistically significant contributory effect. But in private tertiary institution, only Image/outlook of the library in attracting/welcoming users (β: 0.346; p: 0.007) was statistically significant.

Table 4: Indicators of Behavioural Element of performance in Library Building

Behavioural Performance Elements (indicators)	Standardized Coefficients Beta	t-Stats	p-value	ANOVA F-Stats	p-value	Adj.R Square
Federal Institution						
Social interaction among users and staff in the library building	.110	1.214	.228			
Density of functional spaces in the library building?	.332	3.650	.000			32.3
Library spaces in supporting different activities of categories of users	.102	1.067	.288	9.825	.000[b]	
Functional distance between spaces?	.215	2.223	.028			
The circulation routes in enhancing social interaction	.040	.354	.724			
Image/outlook of the library in attracting/welcoming users	.314	2.863	.032			
State Institutions						
Social interaction among users and staff in the library building	.023	.243	.808			
Density of functional spaces in the library building?	.400	4.024	.000			51.4
Library spaces in supporting different activities of categories of users	.031	-.002	.999	14.241	.000[b]	
Functional distance between spaces?	.347	3.056	.003			
The circulation routes in enhancing social interaction	.119	1.138	.259			
Image/outlook of the library in attracting/welcoming users	.426	3.121	.027			

Private Institution						
Social interaction among users and staff in the library building	.243	1.344	.187			
Density of functional spaces in the library building?	.221	1.114	.273			26.7
Library spaces in supporting different activities of categories of users	.252	1.624	.113	3.614	.006[b]	
Functional distance between spaces?	.038	.256	.799			
The circulation routes in enhancing social interaction	.227	1.475	.149			
Image/outlook of the library in attracting/welcoming users	.346	3.363	.007			

Dependent Variable: Behavioural Academic Building Performance; Level of Significant at 5% ($p<0.05$); Significant p-value @ 5%

Source: Researcher's Computation, 2023

Comparison of effectiveness of behavioural performance in tertiary Institutions

Table 5 presents the findings of comparison of effectiveness of the behavioural performance among tertiary educational institutions in Ogun State. The federal institutions obtained a percentage score of 77.27%, while the state institutions obtained a score of 82.98% and the private tertiary institution obtained 78.81% respectively. Findings from the analysis revealed that, state tertiary educational institutions have obtained the highest score of 82.98% compared to the federal tertiary institutions that obtained a score of 80.56% followed by the private tertiary institutions obtaining a score of 78.81%. Adequate consideration is expected to be given to the effectiveness of the behavioural performance in a library building as it is concerned with social and psychological needs of library users. According to Sufar *et al*., (2012); Fasae, Adekola & Idowu, (2021), academic libraries should encourage more social interaction within the library building. This approach is expected to influence the planning and design of the library buildings. Scholars have emphasised the important role the academic library can play as a social space and how the planning and designing can reflect this.

As a result of the important consideration given to this behavioural aspect in library planning and designing, many libraries have employed the open plan or courtyard layout that maximises circulation and interactions and also adequately separate other important spaces. This kind of planning can assist to achieve and preserve the quiet atmosphere in some other parts of the library building.

Table 5: Comparison of Effectiveness of Behavioural Performance in Tertiary Institutions

Behavioural Performance Element	**Federal**		**State**		**Private**	
	Avg. REI	**Rank**	**Avg. REI**	**Rank**	**Avg. REI**	**Rank**
Functional distance between spaces	0.8329		0.8346		.99262	
Image/outlook of the library in attracting/welcoming users	0.8044		0.8324		.68599	
Density of functional spaces in the library building	0.8201		0.8459		.70189	

The circulation routes in enhancing social interaction	0.7851	0.8433	.6859 9
Library spaces in supporting different activities of categories of users	0.7955	0.8155	.5145 0
Social interaction among users and staff in the library building	0.7952	0.8072	.4372 4
TOTAL	**77.27**	**82.98**	**78.81**

Source: Researcher's Computation, 2023

Results And Discussion

Descriptive analysis conducted for the study has successfully identified certain common factors or indicators of behavioural element of performance that can contribute statistically significant improvement to the effectiveness of academic library buildings. These factors are enumerated below:

Density of functional spaces in the library building

The quality of space is an important factor in the planning, design and management of learning environments. This is usually challenging because, architectural spaces have become a strategic tool in achieving personal and organizational goals and objectives especially in the tertiary educational institutions. For the academic library buildings where, different functional activities are expected to take place at the same time, the planning and designing of spaces are expected to support both interactive and autonomous usage. So, in terms of density, spaces are expected to promote both group and collaborative and focused or individual learning activities. Spatial density of functional spaces in the library may impact on the social interaction among users with psychological consequences. These influences may affect users' responses both directly and indirectly (Sufar *et al*., 2012).

Functional distance between spaces

In the academic library building, there are different categories of activity spaces that are connected together through corridors or lobbies that represent circulation routes. The distances between functional spaces and the configuration of circulation routes within the library building may impact on users' experience in both positive and negative ways.

These influences may be in terms of proximity, locational or situational and in some other psychological and social dimensions (Bittencourt, Pereira & Junior, 2015). The ease with which functional spaces are reached or accessed is very important. The ease of accessing a potential destination can be determined by the spatial distribution or configuration of the specific environment and that determines the functionality and how people perceive, feel and behave in that context.

Image or outlook of the library building

The image or general outlook of the academic library building is an important factor. Aesthetics has become an important architectural quality expressed in its three dimensions through the possibility of entering into building's interior to perceive its qualities. Studies have established a positive relationship between aesthetic quality and the built environment (Bittencourt *et al*., 2015). Aesthetics quality in academic library buildings is concerned with issues of beauty and styles employed in the planning, designing and selection of appropriate building material for constructed. This may probably be influenced by philosophy, cultural, historical and other aspects as literature survey has indicated. In academic library buildings, image or aesthetic quality is an

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important consideration to motivate the usage of the facility even into the future. According to Cunningham & Tabur (2012), in the past, many articles have been written about the library as a place referring to its architectural and aesthetic qualities in terms of its space, architecture, furnishings, decor and its overall ambience. Cunningham & Tabur (2012) asserted that this intangible aspect may be difficult to quantify and qualify, yet it has immense influence on the usage.

Conclusion

Conclusively, there is a direct influence of the behavioural element on the effectiveness of the performance of academic library buildings in the study area. However, there is established an indirect influence of the moderating factor (socio-economic characteristics of users i.e. age, gender, marital status, educational qualifications etc.) on the effectiveness of the performance of academic library building. The implications is that in order to capture the feelings, expectations and aspirations of academic library users in the tertiary institutions, in a performance evaluation, the focus of the evaluation must be considered in terms of the specific performance element being considered, in this case, behavioural performance (Mustafa, 2017).

Recommendation

The study hereby made the following recommendations;

i. Adequate consideration be given to those statistically significant indicators of behavioural performances that have statistically significant contributions to effectiveness as feedforward in improving existing buildings and into the building process of new academic library buildings for the achievement of sustainable learning environment.
ii. There should be significant improvement in the planning, designing and management of academic library buildings at the federal, state and privately owned tertiary educational institutions in Nigeria. This is achievable by considering variables, attributes and parameters that are capable to ensure effective performance consistent with satisfaction and comfort of users and organizational goals and objectives.
iii. All regulatory agencies of tertiary education under the Federal Ministry of Education in Nigeria and the physical planning departments of respective tertiary educational institutions should ensure conformance to planning and designing standards and requirements of their buildings and facilities for the achievement of sustainable learning environment.
iv. Tertiary educational institutions in Nigeria should commence regular performance evaluation of their library buildings using POE in particular by integrating users' perspectives, insights and opinions in order to achieve best quality in building performance management. Moreover, by evaluating the feedback from users, it will ensure that the resources in terms of time and money spent in their management will not be a waste and planning departments are able to make inputs for programming for the future.

Contribution to knowledge

This study has contributed to the body of knowledge by bringing about a better understanding of how improvements in the effective performance of academic library buildings in tertiary educational institutions can impact on individuals and organizations in achieving their goals and objectives. Further, the study has provided an exemplary approach for the documentation of performance evaluation of academic library buildings and facilities using POE. The relative effectiveness index (REI) employed as a statistical tool has made the study very unique in contribution to knowledge.

The study has also filled the knowledge gap by providing an empirical platform on how architectural evaluation of academic library buildings can contribute to the achievement of sustainable learning environment in tertiary institutions.

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