

Environmental Performance of Selected University's Administrative Buildings in the Design for University of Ibadan

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Abstract- An important requirement when designing a structure is how suitable it is in meeting users' needs. Administrative buildings represent an important building typology within the University, not only because of their level of resource consumption, but also due to their role as a potential reference in the functionality of university system. In administrative buildings performance levels are usually measured in terms of lighting for visual and thermal comfort, indoor environmental quality. In recent times, there has been a growing recognition of the impact that indoor environmental quality can have on the productivity and well-being of building occupants. The study employed quantitative method of research. The data were collected from both primary and secondary sources. The primary data was collected by means of questionnaire from the three Universities selected for study which are University of Ibadan, Lead city university and First technical university while the secondary data were sourced from relevant literature. The questionnaire were analysed quantitatively using descriptive and inferential statistics. The study found that most of the buildings characteristics are similar such as accessibility to building with some few differences such as number of rooms. It was revealed by the study also that majority of the respondents are dissatisfied or very dissatisfied with the overall thermal comfort of their office buildings. it was conclude that administrative buildings should be able to satisfied its users so as to ensure their comfort and productivity. It was recommended that there is need for more robust users' friendly design of administrative buildings by exploiting the nature in the design such as designed windows and openings efficiently to optimize the use of natural lighting (daylight), thus reducing the consumption of electrical energy.

Key words: Administrative buildings, Environmental performance, Architectural design, University of Ibadan

I. INTRODUCTION

Administrative building is a special type of architecture since ancient times: in the long historical process of development, administrative building developed simultaneously with country and city. Its development process is closely related with the country's political system and social relations; Its design is related not only to the city's economy, culture and other aspects, and more importantly, it is closely related to the political ideology. Thus administrative buildings show significant difference in that it is a building type with its own unique design patterns since ancient times. It also provides valuable information for study of political ideology, city and culture (Yang, 2014).

The design and shape of a building not only impact an individual's productivity and utilization of the building but also the social relationships among the individuals who use the building and those who interact with it from the outside. These relationships are crucial in human life. While psychology focuses on understanding human thinking and behaviour, the main goal of architecture is to create and prepare a living environment for humans (Abdullah and Ahmed, 2023). Many scholars from different country has spent years studying the user satisfaction of building such a library buildings, academic buildings and hostels trying to determine user's perception of the performance of such buildings such as studied by Sholanke et al. (2022) and Anyanwu and Akande (2023). However, perceptions of the physical environmental performance of the administrative buildings that forms the context of this study have not been empirically examined nor measured.

This study is prompted by previous studies conducted in private organisations. They indicate that employee performance can significantly be affected by the physical office environment's comfort in which they perform their duties (Kamarulzaman et al., 2011; Pawirosumarto et al., 2017; Maulidiyah & Ilahi, 2020). Idris et al. (2020) explained that the reason for this focus on private organisations is the need to constantly monitor that the performance of employees contributes to increased profits. On the other hand, public organisations serve their societies with less focus on profits, except to ensure that their performance is impressive enough to secure their government subsidy, donor funding and increased third-stream income. As a result, studies of this nature conducted in public institutions, such as public universities, are lacking (Gastearna-Balda et al., 2021). It seems to ignore that higher education institutions rely heavily on work performed by support departments for the success of their main operational functions (Idris et al., 2020). This support could be in the form of administrative duties for the executive management team, academic leaders in faculties and departments, students, and other stakeholders in the community. Other critical office duties are human resources, finance, registrar's office, procurement and central records. It is evident from literature that the importance of these aspects has been neglected in architectural research, particularly in administrative buildings. The study is intended to provide an in-depth comparative analysis of three administrative buildings from three different universities in Nigeria. The findings of the study have implications towards the improvement of users' comfort, satisfaction and performance in the development of future academic environments. Measuring administrative building user's perceptions is at this juncture made critical because the physical environment has a bearing on user's well-being, safety and attitude (Ngcobo & Mhlana, 2022; Ricciardelli & Carleton, 2022).

This study therefore, intends to examine the comparative user's perception of the performance of administrative buildings in three universities in Nigeria. This is intended to proffer recommendations to correct the observed defects in such buildings. While the specific objectives are to (1) examine the physical characteristics of the selected university

administrative buildings; (2) analyse users perception of thermal comfort (air quality, pollution, e.t.c.) of selected university administrative building;

II. STUDY AREA

The study is limited to the performance evaluation of University of Ibadan, First Technical University and Lead City University administrative buildings in Oyo State, Nigeria.

III. METHODOLOGY

3.1. Research Design

This study used a cross-sectional, quantitative survey design. The survey was distributed to member of staff at the various universities under study with the help of trained assistance. It is the intention of this study to have as large sample of respondents as possible to be able to generalize the results, which is a typical characteristic of quantitative research with a positivistic philosophical stance (Collis & Hussey, 2021). Finally, a quantitative research design is most suitable for this study since it enables us to measure relationships between different variables and make generalized conclusions, thereby making it possible to answer the stated research questions.

3.2. Participants and Sampling

The participants for this study are the Universities staff working in administrative buildings. A total of 121 questionnaires were administered to the respondents of the various universities under study out of which 119 were retrieved all together thus, represent success rate of 98.34% and failure rate of 1.66%. According to Collins and Hussey (2019), response rates for a questionnaire surveys can be 20 – 30% at minimum; hence making 98.34% (119 respondents) response rate for this study is well above stipulated standards. Therefore, this response rate of 98.34% is enough for researcher to draw a conclusion on the subject matter that can represent the opinion of the respondents. Table 1 shows the breakdown of how the overall response from the various Universities understudy was obtained.

Table 1: Respondents Response Rate

University	Questionnaire issued	Questionnaire Received
University of Ibadan	86	85
First Technical University, Ibadan	20	20
Lead City University, Ibadan	15	14
Total	121	119
Response rate	100.0	98.34%

The purposive and convenience sampling technique was used to distribute the survey instruments to respondents who willingly volunteered to provide data for the study in each of the institutions. The survey instruments were shared to the respondents within and around the administrative buildings. The sampling frame for this study consists of the total number of

tertiary institutions in Oyo State, Nigeria. There are about 12 tertiary institutions in Oyo State. One belongs to the federal government, three belong to the state government and eight are privately owned (See Table 2).

Table 2: List of Universities in Oyo State by Ownership

Federal	State	Private
University of Ibadan	Ladoke Akintola University of Technology, (LAUTECH),	West Midlands Open University, Ibadan
	First Technical University, Ibadan	Ajayi Crowther University (ACU),
	Emmanuel Alayande University of Education	Dominion University
		Atiba University, Oyo
		Precious Cornerstone University, Ibadan
		Lead City University, Ibadan
		Kola Daisi University, Ibadan

To select the universities used for the study, ownership status of the university was set as a criterion. These include selecting one university from Federal, State and privately owned Universities within Oyo State. Selected Universities include; University of Ibadan, First Technical University and Lead City University with the choice of the target respondents limited to staff using the administrative buildings.

3.3 Instrumentation

The data collection instrument used for the study is a structured questionnaire, in order to collect relevant primary data from the users of the administrative buildings.

This questionnaire was prepared to assess their perception of the administrative buildings as regards its functionality, circulation and space requirement. The data include the perception of the respondents on:

how much time they spend in the academic buildings; adequate of windows in the buildings for achieving daylighting and natural ventilation; environmental design consideration factors responsible for them enjoying or not enjoying working in the buildings; the extent to which they perceive the adequacy of lighting, ventilation, indoor air and sound quality in the buildings; and the material mainly used to construct the academic buildings.

The second instrument of data collection is researcher's direct observation. Direct observations were carried out simultaneously during fieldwork as questionnaires were being administered on the users of the administrative buildings. Information obtained with the observation checklist include: physical condition of the building, materials used for constructing the building; location of the building in

relation to the university entrance, availability of essential facilities, etc.

IV. RESULTS AND INTERPRETATION

The result of the physical characteristics shows that most of the buildings are similar such as accessibility to building, type of building, walling materials, roof design type, window types, external door types, floor types among others with some few differences such as number of rooms, state of building, building orientation etc.

From the survey, it shows that 33.6% (40) of the respondents are dissatisfied with the overall thermal comfort of their various administrative buildings, 32.8% (39) of the respondents are satisfied, 21.0% (25) of the respondents are undecided, 9.2% (11) of the respondents are very dissatisfied while 3.4% (4) of the respondents are very satisfied with the overall thermal comfort of their various administrative buildings. This result also shows that majority of the respondents are dissatisfied or very dissatisfied with the overall thermal comfort of their office buildings. This satisfaction level is quite very low and this impacts the users job/work performances while using the buildings and therefore, the need for more robust users' friendly design of administrative buildings.

On temperature of building, 37.8% (45) of the respondents say that they slightly feel warm during working hours, 25.2% (30) of the respondents say they are comfortable during working hours, 19.3% (23) of the respondents say they feel too warm during working hours, 16.8% (20) of the respondents feel slightly cold during working hours while 0.8% (1) of the respondents feel too cold during working hours. This result shows that a quarter (i.e. 25%) of the respondents feel comfortable during working hours while majority of the respondents feel either warm or cold during working hours. This is not good and something need to be done so that their working performance will not be affected. Thus, the need for redesigning and improving the administrative buildings for users' comfortability which in turn will boost their productivity.

In terms of air quality of the administrative buildings, 26.9% (32) of the respondents say the air quality is poor, 25.2% (30) of the respondents rate the air quality of the buildings as both good and average, 13.4% (16) of the respondents say the air quality is very poor while 9.2% (11) of the respondents say the air quality is very good. The result shows that majority of the respondents rate the air quality in their various administrative buildings from average and above.

For ventilation within the administrative buildings, 24.4% (29) of the respondents are very dissatisfied with ventilation in their various administrative buildings, 22.7% (27) of the respondents are satisfied, 21.8% (26) of the respondents are dissatisfied, 16.0% (19) of the respondents are very satisfied while 15.1% (18) of the respondents are undecided with the ventilation level of their various administrative buildings. This result shows that majority of the respondents are dissatisfied or very dissatisfied or undecided with the ventilation level of their office buildings.

V. DISCUSSIONS OF RESULTS

These results show that it is crucial to take a study on existing conditions of the buildings in line the environmental performance parameters such as thermal comfort, the acoustic environment, and user preferences as they significantly serve as a guide when designing and renovating administrative office buildings. This is essential as designing an environmental sound administrative buildings does not only improve users' comfort but also help to fight against climate change as well as the transition to a more sustainable built environment. The findings on users physical characteristics and users perception of thermal comfort of the administrative buildings complement and extend the elegant work by Olaniran, (2004). According to him, the physical characteristics that determine users comfort include the wall conditions (are they screeded or not), what colour of and type of paint used in the painting of the wall, the height of the fence (are they tall or they are low), materials used for the windows and whether there are mosquito nets and how many layers there are, the ventilation outlets and the oxygen recharge capacity of the buildings, how much properties are inside the

building, the positioning of the windows and how many they are, the roof type and the materials used, etc. All these jointly affected the variation in effective temperature, in the study areas. These, factors or variables have also been identified by previous workers as determinants of thermal conditions in buildings (see ASHRAE Standard, 2004; Cheung, 2019; Ho et al., 2009).

On users' thermal comfort, Hensen and Lamberts (2019) maintained that office buildings should offer occupants a comfortable, healthy, and productive indoor environment in addition to shielding them from unfavorable exterior environmental conditions. An office setting should offer the required user comfort that fosters productivity, well-being, and health, according to studies by De Wilde (2018) and De Wilde (2019). Moreover, the publication of its Building Energy Efficiency Guideline (BEEG) (Arup and Genre, 2016) confirmed that the highest user requirements for building occupants are for lighting and cooling, confirming the Nigerian Federal Ministry of Power, Works, and Housing's recognition that energy and building performance are related to climate. It suggests eco-friendly structures by taking into account and incorporating "bioclimatic" or "biophilic" projects that may remove or drastically lower the requirement for lighting and cooling by building occupants. Particularly in energy-poor Nigeria, where less than half of the population has access to electricity, energy-efficient and bioclimatic design elements implemented into the building through the exterior envelopes and its components can be beneficial.

VI. CONCLUSION

In conclusion, it was a very clear fact that it is essentials to improve users' comfort so as to enhance their productivity and improve environmental performance of administrative buildings. The literature suggested that numerous factors affect how users perceive the environmental performance of university buildings. These elements include the building arrangement and structural design, the calibre of the acoustic setting, the availability of roomy and comfortable offices, the existence of user distractions, and the capacity to meet a variety of work needs.

Users' also take into account how environmentally friendly and sustainable the management techniques are.

It is noted that from the empirical findings of this study that satisfaction and comfort level of the users is determined by features such as thermal, acoustic, air quality, finishes and other features of the internal environment in regard to circulation, space planning, layout, personal controls and cleaning have significant effects on the satisfaction of users' in office buildings. Of which from the findings, the users' were dissatisfied. Moreover, the findings of this research also showed that the lacked of control of lighting causes direct glare to users, and fixed windows limiting access to fresh air. Also, privacy issue due to the use of curtain walls and glass partitions, and flexibility issue in office spaces like meeting rooms were reported to also not adequate.

From above, the study recommended that a need for more robust users' friendly design of administrative buildings by exploiting the nature in the design such as designed windows and openings efficiently to optimize the use of natural lighting (daylight), thus reducing the consumption of electrical energy

Also, designing the elements of the outer envelope of the building, which separates the inside and outside of the building to reduce energy consumption and enhance the environmental performance of the building through thermal insulation. This saves energy, improves the air quality inside the building, and reduces the amount of heat transfer and air leakage, leading to the rationalization of energy consumption and enhanced thermal comfort.

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