Assessing Workspaces of Office Buildings: A Case of Lagos Office Spatial Characteristics

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Abstract
The spatial characteristics of an office space play a fundamental role in contributing to the performance of the employees who use the office space. An efficient and functional workspace should be designed to cater to the needs of employees as this is critical to their performance as well. Studies from various authors have shown that better results and outcomes are gotten from employees who are satisfied with their workspaces. Although in recent times, the spatial configuration of the workspace has proven to be insufficient as employees are seen to be less productive. This paper aims to assess workspace performance by identifying the spatial characteristics of the spaces employees work. This will be achieved by categorizing the workspace by its makeup. The paper assessed six (6) office buildings where 105 different office types were observed. Qualitative data was gotten and descriptively analysed. The result showed two major domains characterized by the offices in Lagos; physical and functional domains.

Keywords: Office building, Performance, Spatial Characteristics, Utilisation, Workspace

INTRODUCTION

The office having been identified as the daily work environment for the majority of the employed population in society, plays a significant role in the life of its users, as employees and office users spend more than 40 hours per week working thus the office exerts a significant impact upon the lives of a great number of people. The space assigned to an employee to work in an office building is the workspace within that office [1–5]. The concept of "workspace" includes places to meet, to use technology, support spaces where work occurs and amenities to support work such as desks, personal computers and other equipment.

The office is made up of a work environment with several types of spaces and layouts for daily work activities. According to the primary purpose of an office building is to facilitate the provision of workspaces and a work environment for information and knowledge processing. These activities are carried out by staff; as such the main function of office space and environment is to support its occupants in carrying out their assignments at minimum cost and maximum satisfaction.

There has been a lot of focus by architects, space planners and facilities managers on ways to use workspace more efficiently for employees because, employees' performance these days are not driven by compensation or reward, but also by workspace the design of a workplace has both positive and negative impacts on the employees [6]. Some of the negative effects lead to stress, dissatisfaction with the job description and absenteeism. The workspace has been observed to have experienced changes such as a closed plan to an open office

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plan, due to factors such as socio-economic features, advancement in technology and communication and recently the Covid-19 pandemic around the world. These changes however have affected the nature of work being done within the workspace and even the use of the workspaces.

Despite these changes, the workspace has been identified to play an important role in the way work is conducted. The resultant effects of these changes are the growing interest in how occupants of the offices perceive and behave as the function of the workspace changes. The design of the workspace also relies on people's perception of the space, experiences within the space, sizes of the space, the location of the spaces, [8] and the processes and activities that occur within the space as well as office layout. The workspace is now diversifying, and mobile work and territorial workspace are on the increase, forcing organisations to apply quality and cost to effective workspace utilisation design crit. The overall design and space planning of the workspace should keep employees in mind and be flexible enough to adapt to changes within the office building.

More public buildings such as office buildings are continuously finding the need to adjust their work environment to meet the changing socio-spatial and technological needs, because the office workspace for employees constitutes an integral part of the infrastructural facilities required to carry out job duties and work activities satisfactorily [9–11]. Despite decades of research on the workplace, little empirical evidence exists in office design from the perspective of spatial characteristics. On this premise, this study focuses on assessing the spatial characteristics of office workspaces in government office buildings in Lagos, Nigeria.

SPATIAL CHARACTERISTICS OF THE WORKSPACE

Authors from various disciplines such as Planners, Architects, and Estate managers, have shown the impact of the work environment on the perception, behaviour, and performance of people at work. These spatial characteristics parameters from researchers have been summarized in (Table 1). All of the parameters took into consideration the workspace as a whole rather than studying the workspaces based on the different office layout types. For instance, openness, privacy, enclosure and accessibility. examine the ratio of an office's total square footage to the length of all of its internal walls and partitions in their assessment of openness. What this implies is that openness does not justify the differences in partition heights [12–14]. Some other studies have viewed openness in terms of visibility. The extent to which an employee's individual workspace is exposed to outside incursions from others is described by an indicator called accessibility However, the issue with accessibility is whether or not the workspace is in an open office or a cellular office layout type.

Table 1. Spatial parameters studied in Workspace research.

Workspace spatial parameters	Author(s)
Having a door	Hatch (1987).
Workspace size	Oldham and Rotchford, (1983); O'Neill and Carayon, (1993); Veitch *et al*, (2003).
Level/degree of enclosure (partition height and number of partitions)	Charles and Veitch, (2002); Hatch, (1987); Oldham and Brass, (1979); Oldham and Fried, (1987).
Interpersonal distance/proximity	Allen, (1977); Gullahorn, (1952); Kraut and Streeter, (1995); Kraut *et al*.,(2002); Oldham and Fried,(1987); Olson *et al*.,(2002); Sundstrom *et al*,(1980).
Desk position (in relation to office entrance)	Hatch, (1987)
Visible to superior/coworker	Sundstrom *et al*, (1980)
Distance from corridor	Sundstrom *et al*., (1980)
Density	Dean *et al*, (1975); Fried *et al*, (2001); May *et al*, (2005); Oldham and Fried, (1987); Oldham and Rotchford, (1983).
Openness	Oldham and Rotchford, (1983); Peponis and Wineman, (2002).
Accessibility	Oldham and Rotchford, (1983); Peponis and Wineman, (2002); Schuler *et al*, (1981); Sundstrom *et al*, (1980)
Visibility	Peponis andWineman,2002

Source: Hua et al., (2010)

From the research carried out by the authors in (Table 1), it can be inferred that most of these studies did not take into cognizance the typology of the office layout being studied, that is whether it is open plan layout, closed plan type, [15] shared or combined group of office. These studies also show the relationship between some of these variables like visual openness and workplace interaction. Some of the characteristics in Table 1 will be adopted, hence they will be discussed in subsequent subsections for more clarity and understanding of the phenomenon being discussed in this paper; spatial characteristics.

METHODOLOGY
The data type and source for this research were derived from primary sources of the research. The data is qualitative in nature. Hence, it required the use of an open-ended observation guide. The data types gotten were field notes and image data from pictures and photographs. Therefore, the qualitative research method was used.

SAMPLING AND DATA COLLECTION
The sampling method that was used for the study was purposeful sampling [16]. To learn about or comprehend the primary phenomenon underlying the topic being examined, researchers must purposefully choose participants and study locations, Achieving the aim of the study, required selecting office users specifically and office buildings used for administrative purposes, hence purposeful sampling was deemed appropriate to achieve the study aim because purposeful sampling applies to both individuals and sites.

In the collection of qualitative data, five major steps have been identified [7] These steps have been contextualized in this study [18–21]. They include identifying the participants and sites to be visited and used for the study, gaining access to the selected office buildings by gaining permission from necessary heads of offices, determining the types of data to collect from participants (office users) and the office building, development of data collection forms in this case, an observation schedule guide and lastly administering the data collection process in an ethical manner. An observation schedule was adopted for this study.

The unit of assessment was State and Federal Government administrative buildings. This is because of the following reasons; these public offices were initiated and developed by the Federal government of Nigeria. It is expected that the organisational culture of these offices will be similar. More so, the staff strength of these offices is a major criterion for selection and lastly, a blend of a mixture of cultures and different backgrounds of employees from these offices will give an unbiased response from the respondents. Furthermore, in each of the office buildings selected, offices with the same layout typologies and office structure were used for the survey, thereby constituting the sample frame for the study.

RESEARCH INSTRUMENT AND VARIABLES
An observation schedule or guide entails the systematic noting and recording of events and behaviours in a chosen study [7] Additionally, it involves the process of observing people and environments at a research site in order to obtain unstructured, first-hand knowledge. In order to carry out the aim of this study which has to do with assessing the spatial characteristics of workspaces, observation was selected as a suitable method to determine the pattern and trend in workspaces of an office. The variables identified included mainly the design factors. These factors were further broken into two categories; physical components and functional components [22]. The physical components include building location, dimensions of offices, number of floors, arrangement of the functions within the office building and density of functions. The functional components include the layout of spaces, circulation spaces, furniture arrangements, and supporting spaces. The observation schedule semi-structured, open-ended checklist with factors associated with spatial characteristics from literature.

75

This study adopted the descriptive analysis with observation technique in order to access the spatial characteristics of the workspace towards establishing work patterns contextual to Lagos, Nigeria. According to [7] observation is a procedure that gives an insight into situations as they appear to be in real life, and it can be applied to the workspace utilisation phenomenon [23–25]. The study focused on the two major parts of Lagos, which are the mainland and the Island respectively. Ikeja for the mainland and Ikoyi for the Island. As a result, an existing office building was purposefully chosen for the study. The criteria that were considered for this study were the building type and the number of offices available within these buildings. This made it possible to thoroughly examine the offices and gather the necessary information. Therefore, a total number of six (6) office buildings spread across the mainland and Island were observed. A total number of 105 offices were assessed in the six (6) buildings accessed. The selected office buildings were being used by both state government offices of Lagos and federal government offices, in Nigeria as seen in Table 3.5.

Table 3.4. Offices studied.

Arm of Government	Offices Name
Federal government offices	Nigerian Communication Commission (NCC)
	Nigerian Civil Aviation Authority
State government office	Lagos state traffic management authority
	Public service commission office, Lagos
	Lagos State Fire Safety Initiative
	Ministry of Environment, Lagos

Source: (Authors Fieldwork, 2019).

RESULTS

Two major categories of variables were used in the study; the physical and functional components categories [26–28]. Physical components as regards this study refers to those components that have to do with the spatial characteristics of workspaces that aid the day-to-day running of the activity. They are seen to affect the type of job activity that takes place within them, hence, the variables examined comprised of building plan type and office layout type, workstation types and the sizes of the office. Functional components as regards this study refers to those components that have to do with spaces within the workspaces that help daily work and tasks to be carried out within the office as observed in this study. The variables examined comprised storage spaces, space ergonomics, shared printer/copier space, level of enclosure, furniture (desk), and meeting spaces.

OFFICE LAYOUT DESIGN

The office layout type shows five distinctive office types found in Lagos state. Cell office (1 per), Shared office (2-3 per), Small open plan (4-6 per), Open plan (partition) and Cubicle types. (Table 2) indicates 23.8% of respondents use the cell office layout, while 26% use the small open plan (6-10 people). 15 % use the cell office, 46.6% use the shared offices, while 13.3% use the small open plan (4-6 per). 8.5% use the open plan office and &.6% use the cubicle office. This shows that there is a reasonable spread of the office types, depicting respondents' work in the five office types as established by literature from the study. The office layout is a key component of the physical work environment consequently, [28–31] there must be the provision of necessary processes and tools with easy access to improve employee efficiency and performance. The office layout guides in understanding the work process carried out in the office as well as helps to foster communication, hence the office layout helps to create formal and informal spaces as they are seen to foster interaction, networking and communication amongst employees. The office users felt that change and improvement were necessary for their workspace to fully support work tasks and daily work activity.
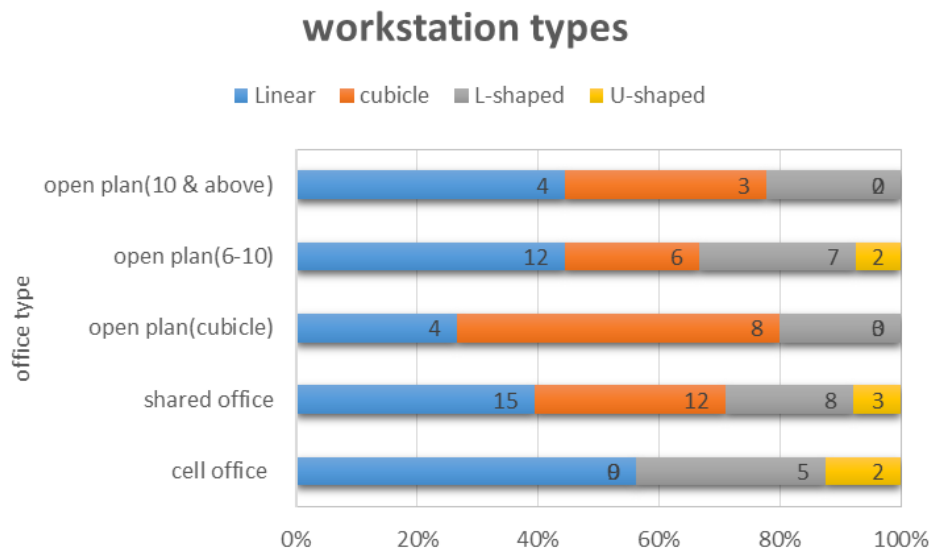
WORKSTATION TYPES

The types of workstations available in the offices were also assessed. The five office types used for this study were cross-tabulated with the various workstations found within the offices. Figure 1 shows the various workstation as observed in the office typologies. The cell office as shown in the figure

below has the linear workstation the most [32]. This is because the cell office is used alone by an office occupant, hence the linear workstation. Although the L-shaped workstation was observed to also be in the cell offices, however, heads of units and departments within the offices use the L-shaped and U-shaped. Inherently, the small open-plan office is characterized by the use of a cubicle workstation type as shown in Figure 2 (a & b).

Table 2. Office Layout design.

Offices	Cell office (1 per)	Shared office (2-3 per)	Small open plan (4-6 per)	Open plan (partition)	Cubicle	Total
Nigerian Com. Commission (NCC)	3	4	2	-	1	10
Nigerian Civil Aviation Authority	6	9	4	3	-	22
Lagos state traffic management authority	5	7	1	-	1	14
Public service commission office, Lagos	4	10	3	2	3	22
Lagos State Fire Safety Initiative	3	5	2	2	1	13
Ministry of Environment	4	14	2	2	2	24
TOTAL	25	49	14	9	8	105
%	23.8	46.6	13.3	8.57	7.61	100

Source: Authors' fieldwork (2021)

Figure 1. Workstation types.
Source: Authors Fieldwork (2021).

Figure 2. (a). Cubicle workstation type. (b). Linear Workstation types.
Source: Authors Fieldwork (2021).

OFFICE SIZES

The allocated square footage per occupant must be followed by offices. Therefore, these sizes are intended as maximums and do not constitute or imply minimum space entitlements. It is, therefore, needful to ensure that exploring the potential of office sizes to meet the requirements of workspaces in less space is encouraged [33–36]. From the observation carried out in the offices under study, the open office planning which is intended to increase flexibility and eliminate the need to reconfigure space as workgroups shift was not seen much as most of the offices were seen to be overcrowded as seen in Figure 3 (a & b). The office types were cross-tabulated with the nature of the job description and the sizes allotted to the workspaces are shown in Table 3.

Table 3. Office sizes.

| Office type		Managerial	Technical	Clerical	Maintenance	Others	Total
1. Cellular Office (1person)	Less than 9sqm	-	1	3	-	1	5
	3M x 3M	3	4	2	1	2	12
	3.6M x 3.6M	4	-	-	-	-	4
	3M x 4.2M	1	1	1	1	-	4
	4.2M x 6M	-	-	-	-	-	0
	➤ 25sqm	-	-	-	-	-	0
Total							25
2. Shared Office (2-3p)	Less than 9sqm	2	3	2	-	4	11
	3M x 3M	4	6	2	4	3	19
	3.6M x 3.6M	1	5	1	4	1	12
	3M x 4.2M	-	3	2	1	1	7
	4.2M x 6M	-	-	-	-	-	0
	➤ 25sqm	-	-	-	-	-	0
Total							49
3. Small open plan (4-9p)	Less than 13sqm	-	-	-	-	-	0
	3.6M x 3.6M	-	1	-	1	-	2
	4.2M x 4.2M	-	2	1	2	2	7
	4.2M x 6M	-	1	-	-	1	2
	6M x 6M	-	1	-	1	1	3
	➤ 36sqm	-	-	-	-	-	0
Total							14
4. open plan (partition	4.2M x 6M	-	-	-	-	1	1
	6M x 6M	-	1	1	1	1	4
	6M x 8M	-	-	-	-	1	1
	➤ 48sqm	-	2	-	-	1	3
Total							9
5. open plan (partition	3.6M x 3.6M	-	-	-	1	-	1
	4.2M x 4.2M	-	1	1	-	1	4
	4.2M x 6M	-	-	1	-	1	1
	6M x 6M	-	1	-	1	-	2
	➤ 36sqm	-	-	-	-	-	-
Total							8

Source: Authors Fieldwork (2019).

STORAGE SPACES

Storage spaces are meant to store office files and equipment that aids the daily work activity. Two types of storage space were assessed, personal and shared storage spaces as illustrated in Figure 2. The storage facility included filing shelves and cabinets [37]. Shared storage spaces are common. This is because most of the employee work in a shared office; hence, they share filing cabinets and shelves. However, some workspaces despite being shared had no access to filing shelves, and a haphazard arrangement of office documents around workspaces (Figure 5 (a) was seen, as well as on their furniture (Figure 5 (b). This implies storage spaces need to be more defined, properly arranged and utilised properly, depending on the nature of the job description.

Figure 3. (a). A 3.6M by 4.5M office. (b). 4.2M by 6M office.
Source: Authors Fieldwork (2019).
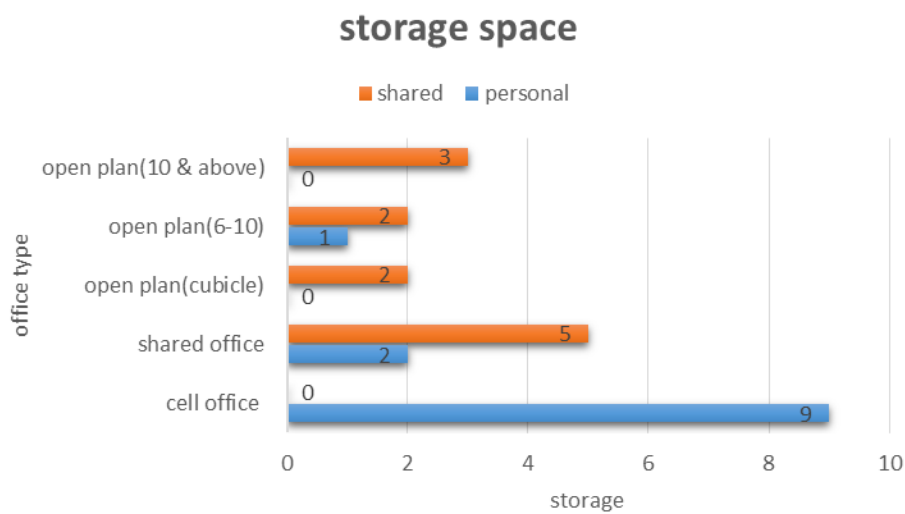
Figure 4. Storage spaces
Source: Authors Fieldwork (2019).

Figure 5. (a). Storage space within workstation. (b). Work files on Table.
Source: Authors Fieldwork (2019).

SPACE ERGONOMICS

Space ergonomics deals with the space around the workstation. As seen in Figure 6 (a & b), the space is being increasingly minimised in an attempt to maximise workspace utilisation due to the population of employees. Workstations are to be accompanied by sufficient space surrounding them. Due to the insufficiency of space ergonomics, it was observed that employees received and attended to their visitors along the lobby and corridors of their offices. During the morning hours of the day especially, this was seen to affect the task of employees as some were absent during the observation process, despite that their spaces were occupied but were not in use. Space ergonomics has a great influence on employee absenteeism.

OFFICE ACTIVITIES

When observing how people use work settings at the office during work hours, it is unsurprising to find that individual work is predominantly done at workstations while collaboration is the predominant activity in meeting rooms (Figure 7). More interesting is to note that about 33% of the time, it was observed that collaboration took place at workstations [38]. Another interesting observation is the number of phone calls and video calls made in both work settings.

The outcome of the analysis of the observed variables assessed across the offices revealed that there are typical work tasks and activity that is performed at the office each day. Therefore, inferences were

drawn from the findings, which suggest that the rate of usage varies because of the different types of offices assessed and the working cultures in those offices. Hence, the work activities observed in the study are; Concentrating (or Individual work), Collaborating, calling (or communicating), creating, relaxing and others (not observable) as seen in Figure 4.

Figure 6. (a & b). Space ergonomics within the workstation.
Source: Authors Fieldwork (2019)

It was observed that 42% of respondents were focused and heads down on work that requires concentration such as reading, thinking, using a laptop, writing notes and reviewing documents, as shown in Figure 8 (a). 33% were observed to be collaborating [39]. Two or more people were seen working together and sharing knowledge/resources, such as in a meeting, discussion or negotiation as seen in Figure 8 (b). 5% of respondents were seen to be having a telephone conversation or video conference using mobile technology. 6% were seen to be taking a break, socializing informally, chatting and recharging during the workday.

Table 4. Classification of activities.

	Solo activity	Grouped activity	Planned activity	Unplanned activity
Concentrating	X		X_2	
Collaborating		X_1	X_2	X
Communicating		X	X_1	X
Calling	X		X	X
Creating	X	X	X	
Relaxation	X		X	X

1 Some physiological activities have a social side effect. 2 this is a planned activity.
Source: Authors' fieldwork, 2020

These activities observed are grouped into four (4) types, based on the nature of the work description of the employees [40]. They are solo, group activities, and planned and unplanned activities. Solo group activity was largely based on whether they required some form of interaction or not. Some job description consists of activity which does or do not require interaction between people. However, despite the solo work taking place, it was observed that some accidental interaction took place, a situation where an employee was observed meeting up while walking between activity locations.

Planned and unplanned activities were seen to be performed by employees during the working days. Most job-related activities are planned. The unplanned activity happened due to unforeseen events, for example, having an unexpected guest or an incoming call. However, unplanned activities form an integral part of the working activity in terms of time spent on these activities. Table 4 illustrates the classification of activity.
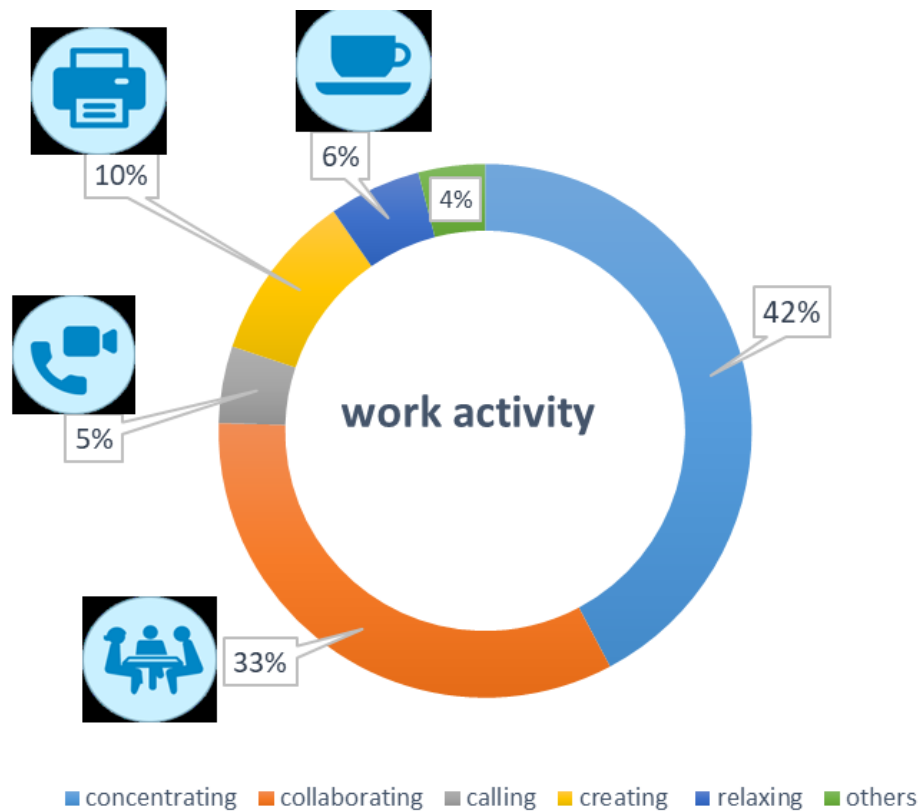
Figure 7. Work activity.
Source: Authors fieldwork (2020)

Figure 8. (a). Concentrating on task. (b). Respondents collaborating.
Source: Authors' fieldwork (2019)

DISCUSSION OF RESULT
Spatial Characteristics of Workspaces

Spatial characteristics are components put in place within an office to make the work experience of users a productive one. Typically, it affects the lifestyle of users of the workspaces because they spend most of their time carrying out various activities within the workspaces. Measurements were taken as well as photographs, notes were also taken, especially notes on answers given to the researcher by respondents in grey areas while the observation was taking place.

A number of authors have attempted to evaluate the spatial components within a given work environment [41]. There are enough similarities between the measures indicated in these past works and those indicated in the current study, although some of the nomenclatures are different. For example, parameters studied. are among the parameters this study examined. Other parameters that made up the physical components include "openness" and "accessibility", "Privacy", "work area adequacy" and "circulation". The physical components of the building also included size, level of fenestration, number of floors, number of users and office types. Similarities were also observed between parameters of the functional components category in this study, some of which are "privacy", "enclosure", "ergonomics" and "storage and supporting spaces" as seen.

The similarities in the current study and previous studies have indicated that these parameters will continue to be discussed as long as the office work environment is concerned. The spatial characteristics in which the employee works are crucial to achieving optimal utilisation of the workspace for the effectiveness of that space and performance on the side of users as well as productivity on the side of the organisation. As such emphasis is placed on the spatial characteristics of the workspace as it relates to the spatial quality of the workspace. This is so in order to evaluate spaces and their fitness for purpose as well as to highlight over and under used rate of specific spaces or locations in connection with effective utilisation and management of the said workspaces. Outcomes were generated to show a flow of work patterns within the workspaces. This is a result of the work activity that takes place within the said workspaces. Work activity goes hand in hand with the nature of job description and workflow within the offices. Hence, six major types of activity were observed to be dominant within the observed offices, they are; Concentrating (or Individual work), Collaborating, calling (or communicating), creating, relaxing and others (not observable). These activities observed were further grouped into four major categories, they are solo, group activity, planned and unplanned activity.

Spatial characteristics play a very important role in the success of an office as inappropriate quality and spatial characteristics may adversely impede or affect the users of the workspaces, their comfort, and work efficiency and this may result in poor staff turnover as buttressed by The importance of the characteristics of a workspace within an office building cannot be over-emphasized, as it is important that proper care and space needed are provided for all office users within the office [42]. Tools such as post-occupancy evaluations (POEs) have been used to assess the conditions of buildings in order to provide insights into decisions for new building designs. However, POEs concentrates majorly on building occupants or users and their requirement. Spatial characteristics is a major parameter needed in evaluating workspace utilisation phenomena, as this is seen not to only concentrate on users only but also on the spaces provided for use.

This agrees with the conclusion of that incorporating the parameters and components of spatial characteristics into consideration will result in optimised space quality of office buildings and improved health for their occupants. It also has the potential to improve the performance of the organisation through increased management effectiveness, satisfaction for workers and higher productivity.

Evidence from the study has also shown that employees take on more job activities than they ought to, sometimes activities that would otherwise be carried out by a group of team. Typically, as established in the background of this study, employees spend up to 54% of their hours per week in their work environment, inevitably affecting their lifestyles. While a workplace may have positive effects on an employee, it may also have negative impacts resulting from poor design and proper planning, which may lead to stress, job dissatisfaction, absenteeism and high turnover . Two major patterns have been established by the study to form the domains that can be classified to understand the impact of the spatial characteristics on the performance of employees. They are the physical and the functional domains.

Recommendation
This study recommends that the spatial characteristics of the workspace should not be neglected as it has been shown to impact positively the performance of office users. It is needful for office users

and owners to be conscious of various characteristics of the spaces where work takes place, the pattern of work activity and users' preferences that must be put into consideration. It will in turn promote the effective utilisation of these workspaces as well as help support organizational reconfiguration and new developments within the office.

CONCLUSION

The current study identified two major domains that are pertinent to evaluating the spatial characteristics of a workspace in office buildings in the study area. These two domains are the physical component domain and functional component domains. Physical components (workspace sizes, types, number of floors, workstation types) and the functional component domain (circulation, accessibility, privacy, storage spaces, supporting spaces and space ergonomics) are found to be influenced by the environment, the activity and the people working within those spaces. The two domains established also revealed a link between accessibility, circulation, privacy and space ergonomics.

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