



## The Role of Daylighting in Enhancing Productivity and Energy Efficiency in Office Spaces in Ikorodu, Lagos

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### Abstract

*This study examines the role of daylighting in enhancing productivity and energy efficiency in office spaces in Ikorodu, Lagos. It explores the impact of natural light on workplace performance, well-being, and energy use while addressing challenges like glare and heat. The research aims to propose effective daylighting strategies for sustainable office environments. This study explores daylighting as a strategy to enhance indoor environmental quality and reduce energy use. It discusses Biophilic and Sustainable Building Theories, emphasizing natural elements in design. Empirical studies highlight daylighting's benefits for productivity and energy savings, while the study addresses gaps in research specific to Ikorodu office spaces. It employs a mixed-methods approach, analyzing daylighting's impact on energy efficiency and productivity in Ikorodu offices. It uses field measurements, surveys, and energy records, with stratified sampling of 60 buildings. Quantitative and qualitative analyses examine daylight levels, energy consumption, and occupant perceptions to assess daylighting's effectiveness. The demographic analysis of 60 respondents reveals a predominantly male (63.3%) and young (63.3% aged 21-30) workforce, with architects as the largest job group (41.7%). Most respondents (55%) have worked in their offices for 1-3 years, and 45% report sufficient daylighting. However, its impact on mood and focus remains mostly neutral. Recommendations include optimizing office layouts for better daylight access, integrating larger windows with shading controls, and enforcing daylight-friendly building regulations. These measures can enhance energy efficiency, workplace satisfaction, and productivity in modern office spaces.*

**KEYWORDS:** Daylighting, Productivity, Energy Efficiency, office spaces, IkoroduLagos

### I. Introduction

According to Stephenson(2021), people spend most of their hours indoors based on their job requirements, season, and age. Optimising the utilisation of natural light in office buildings can drastically lower energy usage and enhance the overall work atmosphere as metropolitan areas like Ikorodu continue to grow (Adegoke & Adedeji, 2023). Using natural light as efficiently as possible in office buildings can speedily lower energy costs and enhance the working environment in Ikorodu (Abdur-Rahman & Abdullahi, 2021). Studies have indicated that natural illumination improves office workers' productivity, well-being, and cognitive performance in addition to lowering their need for artificial lighting (Olaniyan et al., 2021). Ikorodu's tropical climate offers special opportunities and problems for daylighting integration. Although natural light can increase productivity at work, poor design can result in problems like glare and discomfort from the heat (Olubode et al., 2021). The success of daylighting solutions is largely determined by design techniques, including window location, shading devices, and the general architectural layout of the office area (Hirsch, et al., 2022). According to recent research, the integration of suitable shading systems, thoughtful window placement, and passive solar architecture can result in notable energy savings while enhancing worker well-being (Akinlabi & Bello, 2023). For quickly developing areas like Ikorodu, where office space demand is rising along with worries about energy sustainability and environmental impact, the opportunity to increase both productivity and energy efficiency is particularly significant (Ajayi, & Olorunfemi, 2023). A focus on resolving the difficulties and maximizing the advantages of daylighting in a tropical climate, this study aims to investigate how daylighting might improve energy efficiency and productivity in office buildings in Ikorodu, Lagos.



### 1.1 Problem Statement

By lowering the demand for artificial lighting and enhancing occupant comfort, daylighting increases office space productivity and energy efficiency. Energy expenditures can be decreased by up to 60% in offices that use daylighting techniques (Aduwo et al., 2021). Additionally, this change supports environmental sustainability (Aduwo et al., 2021). Many office buildings are not well-designed to take advantage of the abundant natural daylight found in tropical settings, which leads to wasteful energy use and detrimental effects on occupant productivity. Effective daylighting techniques can enhance worker efficiency, cognitive function, and overall well-being while lowering dependency on artificial illumination, according to Stephenson (2021).

Daylighting in office architecture is hampered by glare, heat discomfort, and inadequate architectural integration, among other issues. Without effective daylighting strategies, Ikorodu office buildings may continue to have subpar energy efficiency and decrease tenant productivity. To optimise the use of natural light in office buildings, this study intends to investigate how daylighting could enhance productivity and energy efficiency in office spaces located in Ikorodu, Lagos.

Daylighting and biophilic design are beneficial for productivity in Lagos. Studies show that natural light improves worker performance and overall well-being (Aduwo et al., 2021), and that efficient daylighting makes office spaces more comfortable, which improves productivity (Ewuoso & Covenant University, 2023).

### 1.2 Aim

To examine the role of daylighting in enhancing employee productivity and energy efficiency in office spaces in Ikorodu, Lagos, by analyzing its impact on workplace performance, well-being, and energy consumption, and proposing effective daylighting design strategies for sustainable office environments.

### 1.2 Research Objectives

1. To assess the impact of daylighting on energy efficiency in office spaces in Ikorodu.
2. To evaluate the influence of daylighting on employee productivity and well-being.
3. To explore the relationship between architectural features and the effectiveness of daylighting solutions.

4. To analyse the role of occupant feedback in improving daylighting design and implementation.

### 1.4 Research Questions

1. How does the implementation of daylighting strategies influence the overall energy consumption patterns in office buildings in Ikorodu?
2. In what ways does natural light exposure in office spaces affect employees' productivity and overall well-being?
3. What architectural features are most critical in enhancing the effectiveness of daylighting solutions in Ikorodu's office buildings?
4. How do employee perceptions and feedback regarding daylighting conditions contribute to the design improvements of office spaces in Ikorodu?

### 1.5 Scope of the Study

This study focuses on the role of daylighting in enhancing productivity and energy efficiency in office spaces in Ikorodu, Lagos. It examines the relationship between natural lighting and employee performance, cognitive function, and well-being. Additionally, the research assesses the impact of daylighting on energy consumption, exploring how natural light can reduce reliance on artificial lighting and lower electricity costs. The study also identifies challenges faced in implementing daylighting strategies, such as glare control, thermal discomfort, and architectural design limitations.

The research will be limited to office buildings in Ikorodu, with an emphasis on different workplace settings, including government offices, corporate buildings, and co-working spaces. It will analyse existing daylighting strategies, user experiences, and energy performance metrics. The study will rely on field surveys, case studies, and expert interviews to gather data on daylighting effectiveness. While the research will focus on Ikorodu, its findings could apply to other urban areas in Nigeria with similar climatic and architectural conditions.

## II. Literature Review

### 2.1 Concept of Daylighting

The controlled entry of natural light into a structure to improve indoor environmental quality and lessen dependency on artificial illumination is known as daylighting (Veitch & Galasiu, 2021). To maximize light dispersion, it incorporates thoughtful design features including windows, skylights, light shelves, and reflective surfaces.



## 2.2 Theoretical Framework

### Biophilic Design Theory

To improve environmental sustainability and human well-being, biophilic design theory places a strong emphasis on incorporating natural aspects into constructed spaces. It can be divided into three categories: direct sensations like sunlight, vegetation, and water, indirect experiences like natural materials and pictures, and spatial experiences like prospect and sanctuary (Zhong et al., 2022). According to research, biophilic design enhances cognitive function and lowers stress levels in work environments (Ertas & Güneş, 2023). It also improves healing conditions by promoting psychological well-being and comfort (Andrade et al., 2022). By encouraging areas that are interwoven with nature, the framework also plays a significant part in urban sustainability (Sia et al., 2021).

### Sustainable Building Theory

To reduce adverse effects and improve occupant well-being, sustainable building theory places a strong emphasis on incorporating social, economic, and environmental factors into construction procedures. In the design of sustainable buildings, recent frameworks emphasize the significance of life cycle evaluation, resource efficiency, and occupant health (Zhong et al., 2022). Studies have also explored contractors' adaptation to environmentally sustainable construction, emphasizing the role of resilience, technological innovation, and institutional support in facilitating this transition (Mensah et al., 2020). Furthermore, it has been demonstrated that incorporating biophilic design principles into sustainable buildings enhances environmental performance and occupant well-being (Zhong et al., 2022). Together, these strategies seek to develop constructed environments that support long-term sustainability objectives by being resource-efficient, commercially feasible, and socially advantageous.

## 2.3 Empirical Review

Recent empirical studies have highlighted the significant benefits of integrating daylighting strategies in office environments. For instance, Ingabo and Chaiwiwatworakul (2021) demonstrated that combining daylighting with task-ambient lighting can lead to substantial energy savings, with reductions in lighting energy consumption ranging from 10% to 90%, depending on the specific office configuration. Additionally, Nurick and Thatcher (2023) found that improved indoor environmental quality, including effective daylighting, positively

impacts individual productivity, engagement, and well-being among knowledge workers in green-certified office buildings. Furthermore, Haghani et al. (2023) evaluated a novel Reversible Daylighting System (RDS) and reported enhanced energy efficiency in office spaces across various climatic zones, attributing the improvements to the system's rotating capability, which optimizes natural light utilization throughout the year. Collectively, these studies underscore the importance of incorporating advanced daylighting solutions to promote energy efficiency and occupant well-being in modern office design.

## 2.4 Gaps in Literature

Even though daylighting has been studied extensively, not much of it has been studied in Ikorodu, office spaces. This study fills this knowledge gap by evaluating local daylighting circumstances and suggesting customized energy-saving measures.

## III. Methodology

### 3.1 Research Design

This research uses a mixed-approaches strategy that incorporates both qualitative and quantitative data-gathering methodologies. By combining these techniques, a thorough grasp of how daylighting affects energy efficiency and productivity in Ikorodu, office spaces is guaranteed.

### 3.2 Study Area

All year long, Ikorodu, a fast-growing Lagos neighbourhood, is hot and sunny. Because of these weather patterns, daylighting techniques are essential for lowering the need for artificial lighting, boosting indoor air quality, and increasing productivity at work. The study examines the effects of daylighting solutions on energy efficiency and occupant well-being in Ikorodu office spaces.

### 3.3 Data Collection Methods

#### Primary Data

Field Measurements: To ascertain the distribution and penetration of natural light, lux meters were used to measure daylight levels in a few chosen office buildings.

Surveys and Interviews: To learn more about office workers' perceptions of comfort, productivity, and daylight quality, questionnaires and semi-structured interviews were used.

#### Secondary Data



**Energy Consumption Records:** To evaluate the energy savings related to daylighting techniques, historical data on electricity usage in the chosen office areas was examined.

**Review of Current Literature:** This section examines pertinent books, architectural manuals, and sustainability studies about daylighting and workplace productivity.

**3.4 Sampling Techniques and Sample Size**

A stratified sample technique was used for this investigation of how daylighting improves energy efficiency and productivity in business buildings in Ikorodu, Lagos. This approach is especially appropriate since it guarantees representation from a range of office building types according to unique architectural elements that may affect the efficiency of daylighting.

**Method of Stratified Sampling**

The population of office buildings was separated into discrete strata using the stratified sampling approach according to important architectural elements that could influence daylighting. These tiers will consist of:

1. **Building Orientation:** Offices that face various directions from the sun, such as east-west, south-west, and north-facing.
2. **Type of Building:** mixed-use buildings, high-rise office buildings, single-story office buildings, and buildings with little windows or a lot of glass.
3. **Building Age:** Newer, more contemporary designs with integrated daylighting features are contrasted with older structures.
4. **Energy Efficiency:** Workplaces with or without certain energy-saving elements, such as automated lighting controls or daylight sensors.

To ensure broad representation across a range of office spaces in Ikorodu, office buildings that satisfy the research criteria was chosen at random from each stratum.

**Sample Size**

For the study, a target sample size of sixty office buildings was selected. This enables trustworthy comparisons between the strata by striking a compromise between attaining statistical significance and practicality. To support the study's objectives of examining how daylighting might improve productivity and energy efficiency, information on daylight levels, energy usage, and tenant comments was collected for each building.

**3.5 Data Analysis Techniques**

This study on the role of daylighting in enhancing productivity and energy efficiency in office spaces in Ikorodu, Lagos employs both quantitative and qualitative analysis techniques to ensure a comprehensive understanding of the relationship between daylighting, energy consumption, and productivity.

**Quantitative Analysis**

The statistical analysis was performed on the quantitative information gathered from field measurements of sunshine levels and energy usage logs. The goal of this analysis was to find relationships between energy use (in kWh) and daylighting conditions (measured in lux levels). The degree to which daylighting solutions reduce the energy consumption of artificial lighting was ascertained by statistical method such as descriptive statistics. Additionally, a comparative study was carried out to evaluate differences in energy savings and productivity outcomes between offices with various daylighting characteristics.

**Qualitative Analysis**

Thematic analysis will be used to examine the qualitative information obtained from office occupant surveys and interviews. This strategy will enable a thorough investigation of how workers perceive daylighting's effects on well-being and productivity at work.

**IV. Findings and Discussion**

**Demographic Analysis**

**Table 1:** Descriptive Statistics of Gender of Respondents.

		Gender			
		Frequency	Percent	Valid Percent	Cumulative Percent
GENDER	Male	38	63.3	63.3	63.3
	Female	22	36.7	36.7	100.0



Total	60	100.0	100.0
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Source: SPSS Field Survey, 2025

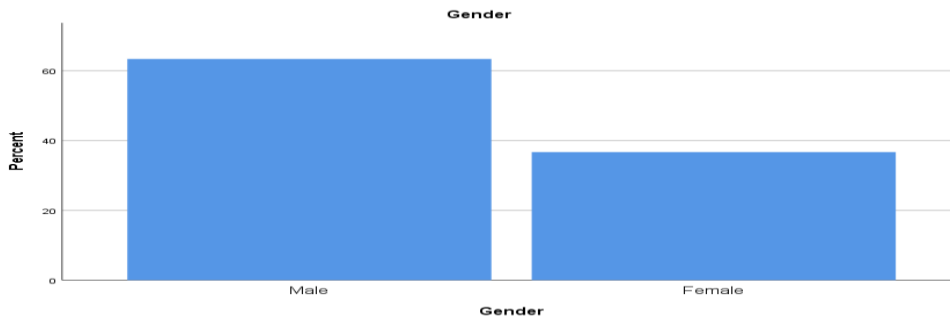


Figure 1: Showing the gender of respondents

From the survey, 63.3 % were male (38) respondents while 36.7% are female (22) respondents.

Table 2: Descriptive Statistics on Job Role of Respondents.

Job Role		Frequency	Percent	Valid Percent	Cumulative Percent
JOB ROLE	Architects	25	41.7	41.7	41.7
	Sales Managers	10	16.7	16.7	58.3
	Fashion Designers	9	15.0	15.0	73.3
	Managers	7	11.7	11.7	85.0
	Teachers	5	8.3	8.3	93.3
	Tech Support	4	6.7	6.7	100.0
	Total	60	100.0	100.0	

Source: SPSS Field Survey, 2025

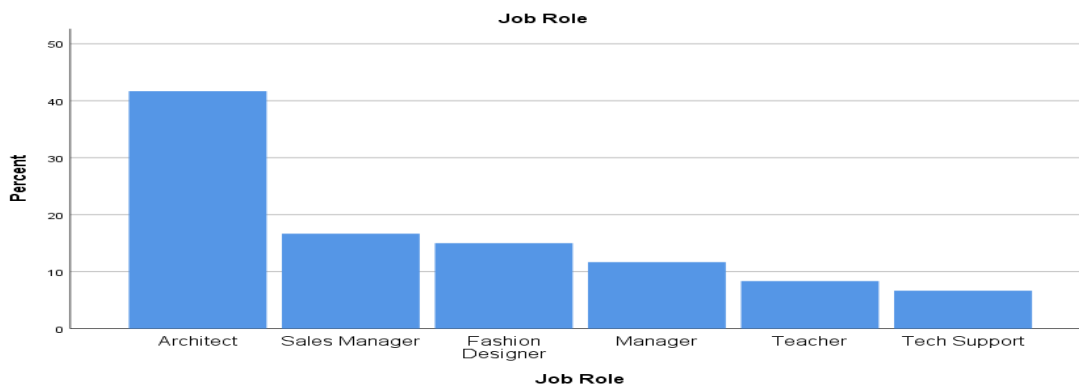


Figure 2: Showing the job role of respondents

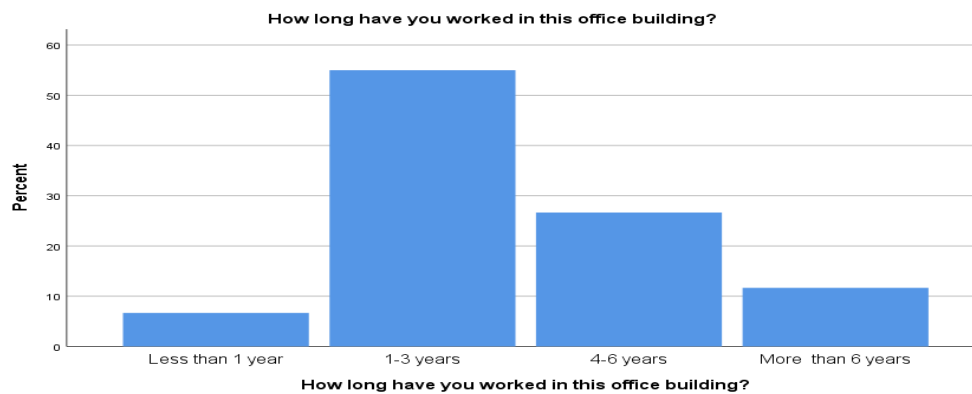
From the survey, the job role respondents include Architects (41.7%), Sales manager (16.7%), Fashion Designers (15.0%), Managers (11.5%), Teachers (8.3%) and Tech Support (6.7%).



**Table 3:** Descriptive Statistics on Duration of Employment in Office Building of Respondents.

		How long have you worked in this office building?			
		Frequency	Percent	Valid Percent	Cumulative Percent
DURATION	Less than 1 year	4	6.7	6.7	6.7
	1-3 years	33	55.0	55.0	61.7
	4-6 years	16	26.7	26.7	88.3
	More than 6 years	7	11.7	11.7	100.0
	Total	60	100.0	100.0	

Source: SPSS Field Survey, 2025



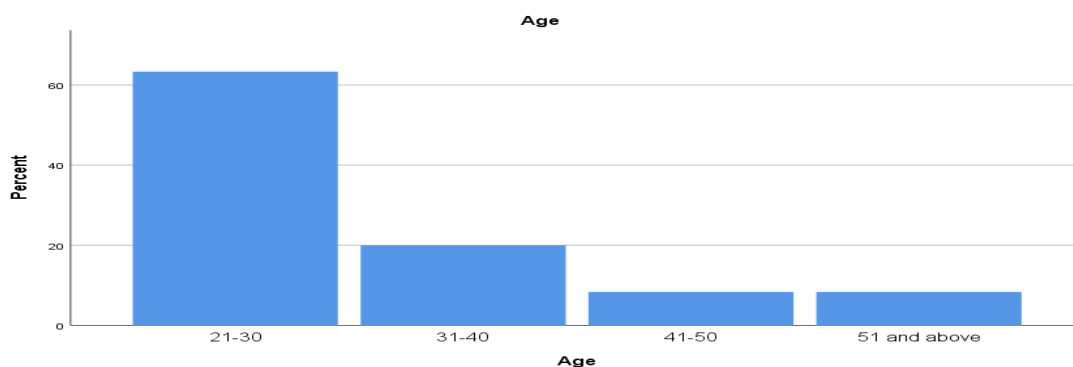
**Figure 3:** Showing the duration of employment in office building of respondents.

From the survey, the number of years in the office buildings include Less than 1-year (6.7%), 1-3 years (55.0%), 4-6 years with (26.7%), and more than 6 years with (11.7%) respondents.

**Table 4:** Descriptive Statistics on Age of Respondents.

		Age			
		Frequency	Percent	Valid Percent	Cumulative Percent
AGE	21-30 years	38	63.3	63.3	63.3
	31-40 years	12	20.0	20.0	83.3
	41-50 years	5	8.3	8.3	91.7
	51 and above years	5	8.3	8.3	100.0
	Total	60	100.0	100.0	

Source: SPSS Field Survey, 2025



**Figure 4:** Showing the age of respondents

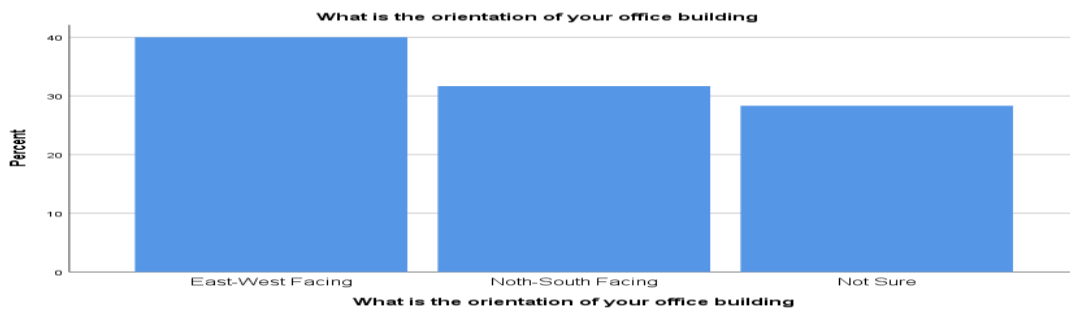


From the survey, the age of respondents in the office buildings include 21-30 years (63.3%), 31-40 years (20.0%), 41-50 years (8.3%), 51 and above years (8.3%).

**Table 5:** Descriptive Statistics on the Orientation of Office Buildings of the Respondents.

What is the orientation of your office building?					
		Frequency	Percent	Valid Percent	Cumulative Percent
ORIENTATION	East-West Facing	24	40.0	40.0	40.0
	Noth-South Facing	19	31.7	31.7	71.7
	Not Sure	17	28.3	28.3	100.0
	Total	60	100.0	100.0	

Source: SPSS Field Survey, 2025



**Figure 5:** Showing the orientation of office buildings of the respondents.

From the survey, the Orientation of the office buildings include East-West Facing 40%, North-South Facing 31.7%, and Not Sure 28.3%

**Table 6:** Descriptive Statistics on How Old the Office Building Respondents.

How old is your office building					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 5 years	26	43.3	43.3	43.3
	5-10 years	15	25.0	25.0	68.3
	More than 10 years	19	31.7	31.7	100.0
	Total	60	100.0	100.0	

Source: SPSS Field Survey, 2025

From the survey, how old the office building respondents includes less than 5 years (43.3%), 5-10 years (25.0%) and more than 10 years (31.7%).

**Daylighting and Energy Efficiency Analysis**

**Table 7:** Descriptive Statistics on Natural Light Reception (Frequency Distributions)

How much daylighting does your office space receive during the day?					
		Frequency	Percent	Valid Percent	Cumulative Percent
	Very little	4	6.7	6.7	6.7
	Moderate	20	33.3	33.3	40.0
	Sufficient	27	45.0	45.0	85.0



Excessive	9	15.0	15.0	100.0
Total	60	100.0	100.0	

Source: SPSS Field Survey, 2025 Lighting Sources and Energy Consumption

Table 8: Cross tabulation on daylighting and primary sources

How much daylighting does your office space receive during the day? * What is the primary source of lighting in your office? Crosstabulation					
Count					
		What is the primary source of lighting in your office?			Total
		Natural Lighting	Artificial Lighting	Combination of both	
How much daylighting does your office space receive during the day?	Very little	1	2	1	4
	Moderate	4	6	10	20
	Sufficient	13	2	12	27
	Excessive	2	0	7	9
Total		20	10	30	60

Source: SPSS Field Survey, 2025

Table 9: Chi-Square Tests on daylighting and primary sources

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	13.006 <sup>a</sup>	6	.043
Likelihood Ratio	13.454	6	.036
Linear-by-Linear Association	.147	1	.701
N of Valid Cases	60		

a. 8 cells (66.7%) have expected count less than 5. The minimum expected count is .67.

Source: SPSS Field Survey, 2025

Mood and Focus Assessment (Frequency Analysis)

Table 10: Descriptive Statistics on Mood Level Assessment on Daylighting

Mood Level					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Negative	8	13.3	13.3	13.3
	Negative	9	15.0	15.0	28.3
	Neutral	32	53.3	53.3	81.7
	Positive	6	10.0	10.0	91.7
	Very Positive	5	8.3	8.3	100.0
	Total	60	100.0	100.0	

Source: SPSS Field Survey, 2025

13.3% of respondents reported very negative impact of daylight on mood level, 15.0% reported a negative impact, 53.3% were neutral on mood level, 10% reported positive on impact of daylight on mood level, while 8.3% reported very positive on impact of daylight on mood level.

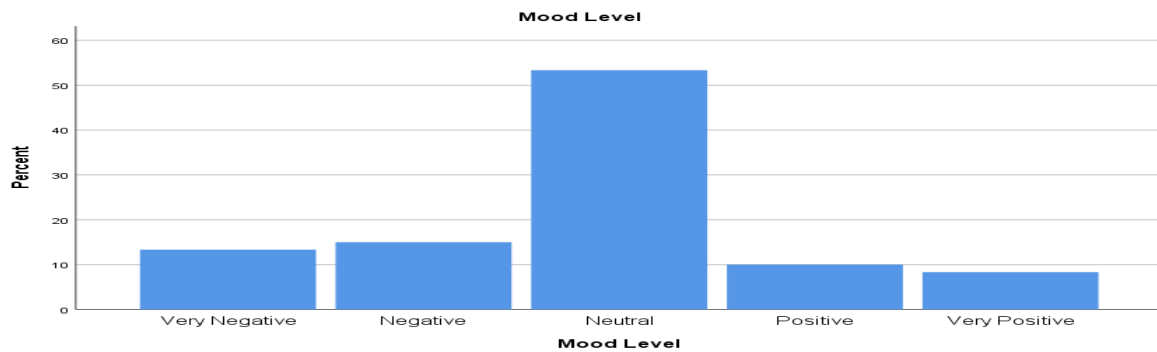


Figure 7: Bar chart on Mood Level Assessment on Daylighting of Respondents

Table 11: Descriptive Statistics on Focus Level Assessment on Daylighting

Focus Level					
		Frequency	Percent	Valid Percent	Cumulative Percent
Mood Level Assessment on Daylighting	Very Negative	4	6.7	6.7	6.7
	Negative	3	5.0	5.0	11.7
	Neutral	41	68.3	68.3	80.0
	Positive	6	10.0	10.0	90.0
	Very Positive	6	10.0	10.0	100.0
	Total	60	100.0	100.0	

Source: SPSS Field Survey, 2025

**Key Findings:**

6.7% of respondents reported very negative impact of daylight on focus level, 5.0 % reported a negative impact of daylight on focus level, 68.3% were neutral on focus level, 10% reported both positive and very positive on impact of daylight on focus level.

**Thematic Analysis**

Theme	Findings	Implications & Recommendations
<b>Neutral Perception of Daylighting's Impact on Mood and Focus</b>	Majority (53.3%) felt neutral about mood impact; 68.3% reported no significant effect on focus.	Current daylighting strategies may not be optimized; further adjustments needed to enhance productivity benefits.
<b>Positive Effects of Daylighting on Work Environment</b>	8.3% reported very positive effects, citing improved comfort, reduced eye strain, and increased engagement.	Enhance natural light exposure through optimized office layouts and daylighting strategies.
<b>Negative Experiences Due to Poor Daylighting Conditions</b>	13.3% reported very negative effects, mentioning glare, inconsistent daylight distribution, and discomfort.	Implement dynamic daylighting solutions (e.g., light shelves, blinds) to minimize glare and optimize light distribution.

**V. Conclusion and Recommendation**

**Summary of Key Findings**

**Demographic Analysis**

The demographic analysis of the survey respondents provides valuable insights into the composition of the sample. The data collected from 60 respondents is summarized in several tables, each focusing on different demographic aspects.

**Gender Distribution**

Table 1 shows that 63.3% of respondents were male (38 individuals), while 36.7% were female (22 individuals). This indicates a male-dominated sample in this survey.

**Job Role Representation**

Table 2 outlines the job roles of respondents, revealing that the largest group consisted of



Architects at 41.7% (25 respondents), followed by Sales Managers (16.7%), Fashion Designers (15.0%), and others, including Managers (11.7%), Teachers (8.3%), and Tech Support (6.7%). This distribution highlights the predominance of professionals in creative and management roles.

#### Duration of Employment

Table 3 presents data on the duration of employment within office buildings. A significant majority, 55.0% (33 respondents), have worked in their current office for 1-3 years, while 26.7% have been there for 4-6 years, and only 6.7% have worked there for less than a year.

#### Age Distribution

Table 4 indicates that most respondents (63.3%) are aged between 21-30 years, with only a small percentage (8.3%) being over 50 years old. This suggests a younger workforce in the surveyed offices.

#### Office Building Orientation

Table 5 reveals that 40% of respondents work in East-West facing buildings, while 31.7% are in North-South facing buildings, and 28.3% are unsure about their building's orientation.

#### Age of Office Buildings

According to Table 6, a large portion of the office buildings surveyed are relatively new, with 43.3% being less than five years old.

#### Daylighting and Energy Efficiency Analysis

The analysis of daylighting within office spaces provides insights into natural light reception and its impact on mood and focus levels among respondents.

#### Natural Light Reception

Table 7 indicates that most respondents (45%) feel they receive sufficient daylighting, while only a small fraction (6.7%) report very little daylighting in their office spaces.

#### Lighting Sources

Table 8 cross-tabulates daylighting reception with primary lighting sources, showing that those who receive sufficient daylighting tend to rely more on natural lighting compared to artificial sources.

#### Mood and Focus Assessment

The impact of daylighting on mood and focus was assessed through frequency analyses.

#### Mood Level Assessment

Table 10 shows that a majority (53.3%) of respondents felt neutral about the impact of daylight on their mood, while only a small percentage reported very negative (13.3%) or very positive (8.3%) effects.

#### Focus Level Assessment

Similarly, Table 11 indicates that most respondents (68.3%) felt neutral regarding the effect of daylight on their focus levels, with only a minor fraction reporting very negative or very positive impacts.

#### Key Findings

**Demographic Trends:** The sample is predominantly male and young, with a significant representation from architects.

**Employment Duration:** Most respondents have been employed in their current office for a moderate duration.

**Daylighting Effects:** While many report sufficient daylighting, its perceived impact on mood and focus is largely neutral among respondents.

**Building Characteristics:** The majority of office buildings are relatively new and oriented favorably for natural light reception.

#### Practical Recommendations

Based on the demographic analysis and daylighting assessment, the following recommendations are proposed to optimize workplace environments:

#### Architectural Design Enhancements

Given that many office buildings are relatively new and a significant proportion of employees report neutral mood and focus levels, architects should integrate larger windows with shading controls. This approach ensures ample daylighting while minimizing glare, thereby enhancing employee comfort and productivity. Additionally, designing office buildings with optimal orientation (preferably North-South) can maximize natural light distribution.

#### Workplace Layout Optimization

Employers should strategically align desk layouts with natural light paths, particularly in East-West oriented buildings where sunlight exposure varies significantly throughout the day. This adjustment can improve employees' overall well-being by reducing reliance on artificial lighting and creating a more comfortable workspace.

#### Policy and Regulatory Measures



Policymakers should enforce building regulations that prioritize daylighting as a core component of office design. Implementing daylighting standards in building codes will ensure that new office developments integrate sustainable lighting solutions, improving workplace satisfaction and energy efficiency.

By implementing these recommendations, workplaces can achieve better daylight utilization, improved employee well-being, and enhanced overall productivity.

#### Future Research Recommendations

Further research should explore the implementation of dynamic daylighting systems and smart lighting controls in office spaces in Lagos. Given that a majority of respondents had a neutral perception of daylighting's impact on mood and focus, future studies should assess how automated daylighting solutions—such as adjustable blinds, light shelves, and daylight-responsive sensors—can optimize natural light distribution. Additionally, research should examine how these technologies influence employee productivity, well-being, and energy efficiency across various office layouts and building orientations. Comparative studies between traditional daylighting methods and smart lighting systems would provide valuable insights into their effectiveness in enhancing workplace conditions.

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