



Inclusive Design: Principle-Based Case Studies of the Nigerian Built-Up Space

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Abstract: *Inclusive Design (ID) is a paradigm that is hinged on the basic need to accommodate the variegated needs of all individuals, irrespective of their age, ability, and social and financial status as they interact with a livable space. As urbanization accelerates across our clime, the need for accessible, equitable, and user-centred spaces has become increasingly crucial. Even though the Nigerian built space is making concerted efforts to latch into the philosophy of Inclusive Design (ID), there are still observable shortfalls in the adoption of associated inclusivity strategies in its housing development schemes. To this end, it became pertinent to take an in-depth view into the narratives of renowned authors who have asseverated the need for Inclusive Design (ID), extract their multifaceted dimensional views of the subject matter and coalesce them into a subset that is more aggregated and informed upon exigencies of the Nigerian built space. Such aggregates – quintuple principles, informed the methodology that directed this study. The methodology includes analysis of key case studies, unstructured interviews and observation of Inclusive Design (ID) strategies adopted in selected Nigerian public and residential envelopes. The exploratory study identified the extent to which these principles were deployed, towards highlighting the gaps in current practices and proffering solutions for more universally accessible environments. Findings cited several lapses in Inclusive Design (ID) strategies adopted in documented case studies, especially physically challenged users. More importantly, the study noted that such gaps were fallouts of the failure of the professional architect and subsisting building regulations. Recommendations advanced a body of knowledge which will, not only rejig the capacity to provide spaces that truly work for all users but also sustain the fervour of implementation by appropriate authorities. This way, architects, urban planners, and policymakers will be better equipped with strategies to ensure equitable access and participation of users and maintain their circadian rhythm for a sustainable and habitable envelope in Nigeria's rapidly evolving built environment.*

Keywords: Case Studies, Circadian Rhythm, Inclusive Design, Quintuple Principles, Urbanization.

1. Introduction

Inclusive Design (ID) is design that considers the full range of human diversity concerning ability, language, culture and other forms of difference (Inclusive Design Research Center, 2024). Instead of a “one size fits all” solution, ID looks at the range of human capabilities from the outset and develops solutions that can be used by everyone—without any adaptation (Keates, 2015).

As a concept in Architecture, Inclusive Design (ID) focuses on the designing of buildings and other elements to be accessed by people with varying physical or sensory abilities (Matteo & P, 2024). The aim of this strategy extends much further than just satisfying the legal accessibility requirements. ID is

designed to ensure that environments are accessible enough for everyone, irrespective of their age, ability or disability, and societal or financial background.

ID is about making places and products everyone can use (Joyce, 2022). Inclusive Design (ID) aims to remove barriers that create undue effort, separation and dead spots thus improving the synergy of spaces and ergonomics of products (CABE, 2024). Everyone participates equally, confidently and independently in everyday activities. ID creates new opportunities to deploy creative and problem-solving skills. It improves the way users interact with their built environment. It is



the sole responsibility of the architect to create spaces and products that perform in line with the principles of ID. The architect must have the capacity to deploy creativity and lateral thinking towards floating innovative and individual solutions. This way, individuals with diverse variability and peculiarities are reached irrespective of the primary location of their environment.

Problem Statement, Aim and Objectives

The country's urban and rural built spaces are marked by housing developments that exclude people with disabilities, the elderly and other vulnerable persons. Such barriers to inclusivity stem from a combination of factors which can be aggregated under two major variables: professionalism and institutional policy. This has affected the capacity of habitable envelopes in the country to provide effective facilities like ramps, elevators, clear signage and adaptable layouts.

The aim was to explore how ID principles can be better deployed in the country's built-up spaces. This involved critical analysis of data collated from three methods - case studies, unstructured interviews and observations of selected facilities, which focused on how they adhered to or neglected inclusivity strategies. This brought to the fore, gaps and opportunities for improving accessibility and inclusivity in the Nigerian context.

The objectives include:

- a. evaluate the performance of inclusivity strategies in existing urban developments,
- b. identify and address critical gaps and barriers to the implementation of ID strategies,
- c. correlate the impact of ID on user satisfaction and
- d. advance actionable recommendations based on the analysis and findings from the dossiers.

2. ID/Good Design Alternation: The formulae

Good Design = Inclusive Design – Eqn. (1) (John, Roger, Simeon, & Cherie, 2003).

'Design' does not only refer to habitable envelopes. It encompasses services and products

innovatively fronted by architects to solve a problem (Shaoxiong, Le, & Changhai, 2020).

Good Design = ID = % inclusive environment – Eqn. (2) (Maze, 2024).

Equation (2) defines what constitutes an ID, and by extension, a good design. The architect, by his training and CPD engagements, must ensure that designs and products are consummated in line with inclusive principles (CABE, 2024).

Good Design = ID = % usage by diverse persons – Eqn. (3) (Bhat, 2024).

Equation (3) delineates the relationship between usage and identifiable barriers which reduce the percentage usage of a design, space or product. The status of being a 'good design' deteriorates if the product or design imposes barriers of any kind. A good design will be inclusive if frustration and rigidity experienced by many diverse users – disabled people, older people and underaged persons – can be overcome.

3. Quintuple Principles

Several authors with varying specialities have proffered several suggestions as principles of ID. Their works have had an impact on the definition and narratives around the subject, especially in advancing theoretical frameworks and practical directives for architects.

An attempt was made to identify some of these authors and the key contributions of their works. This helped to offer an enabling vista towards proffering an all-encompassing bastion of knowledge on the principles of ID.

Ronald Mace's advocacy for designs that revolved around the needs of all diverse populations gave credence to the floatation of the term – Universal Design: a 'one-design-fits-all-envelope' that caters for the needs of all persons. This gave rise to the interchangeable use of Universal Design as ID. Ronald Mace's emphasis was on the creation of built spaces that are completely accessible to persons irrespective of age, physical endowments and societal caste (Ronald, 1998).

Rob Imrie's work has encouraged architects and planners to consider the diversity of human physiques in every design process. Emphasis on

anthropometrics was escalated to factor in the need to advance the intersection of disability studies and architectural design. His contributions brought to the fore, social dimensions of schemes and built-up spaces with a major focus on persons with disability and how they must access such spaces (Rob & Rachael, 2014).

Roger Coleman had almost the same persuasion as Rob Imrie. While the former focused on the disabled and the need to factor in their disability in designs, Rob Imrie's passion revolved around how senior citizens, the aged and older adults should be considered in the built environment. He has directed quite a lot of research on how schemes could accommodate and cater for the well-being of older persons with debilitating disabilities (Roger, Cherie, Simeon, & John, 2003).

John Clarkson believed in fusing ID practices into software applications, programs and jurisdictional planning requirements. This way, users of such products will be kept in line in maintaining ID tenets before, during and after the consummation of a design process. John Clarkson worked together with Roger Coleman.

Simeon Keates's work focused on persons with diverse capabilities in handling technology. His interest lies in birthing inclusive products and how to make such products ergonomic; to fit in peculiar environments. He championed synergy between Human-Computer Interaction and ID (Simeon, John, Peter, & Patrick, 2004).

Geoffrey Thomas focused on product development. His work took into consideration user-centered design schedules which allowed diverse populations to make use of such products. These products complemented the space where they are located irrespective of limitations vis-à-vis spatial concerns. His work diversified the objectives of ID to include products which ab initio, focused only on design (Simeon, John, Peter, & Patrick, 2004).

Given the preceding, it can be surmised that the Commission for Architecture and the Built Environment's "The Principles of ID" is in tandem with Ronald Mace's 'Universal Design', Rob Imrie's 'Disability Concerns of Users in the Built-up Space', Roger Coleman's 'Participatory Design: The Architect and the Aged Client', John Clarkson's

'Hosting ID on System Development Channels', Simeon Keates' Diversity and Difference Factor' and Geoffrey Thomas' 'Flexibility of Products in the Built Environment'. Figure 1, graphically captures the quintuple principles of ID.



Figure 1: CBE's Principles of ID. Source: Authors' Fieldwork.

a. First Principle: Breakdown of Rigid Barriers

Rigid boundaries must be de-escalated to ensure that spaces infuse into each other. A good example is steps. Steps should be avoided. This can be done with a gentle ramp that can neutralise

sudden changes in levels and floors.



Figure 2: (a) = Ramp design and requirements for wheelchair users; (b) = Low window sill that is generally less than 900mm from the finished floor level.; (c) = MOVE SMD150 Automatic Sliding Door System; (d) = Different designs of wheelchair-accessible kitchen islands. Such products can offer solutions to diverse users irrespective of their mobility challenges. Source: <https://www.arch2o.com/ramp-design/>

Obscurity to views must also be discouraged with the introduction of low window sills and large transparent curtain walls, especially, in commercial zones (Christopher, Roshida, Adejoh, Usman, & Isah, 2024). These considerations make spaces more seamless and easily accessible by any defined universal set of populations.

b. Second Principle: Accessibility Factor

A very important principle is to always consider the diversity of users and their different needs within the built-up space. In short, an ID must make plans for everyone regardless of age and different needs (Sensory Trust, 2024). This includes a tourist who is being encumbered with luggage, a parent who is

moving with a retinue of children, an older person with mobility impairment and persons with communication deficiencies. An ID must be able to factor in their incapacities. As much as possible, all issues that militate against the full usage of spaces must be removed (Uji, 2024). To this end, single-swing doors that could be wider than standard specifications should be installed to grant unfettered access to segmented users – persons who may be moving with caregivers and children. Doors must also be visible while non-slip materials should be used in areas that witness substantial pedestrian traffic. The best possible situation would be the adoption of doors retrofitted with motion sensors and powered by solar energy. These automatic doors respond to the proximal movements of users by opening and closing without physical contact (Geze, 2024).

c. Third Principle: Adaptability

It must be noted that an ID is not expected to solve every problem. However, it must be able to offer several avenues for advancing superior solutions (Infosys Limited, 2024). This also includes factoring in everyone's inadequacies on equal terms (Interaction Design Foundation, 2016). A good example is when an adjustable counter can be lowered to attend to persons with height challenges. The architect can also innovate the design of the kitchen by having wheelchair-accessible kitchen islands for users who may be constrained to wheelchairs. This way, the architect will be creating a product which can be used by all

d. Fourth Principle: Ergonomics

The architect must not only be responsible for advancing adaptable spaces. The architect must also be aversed in creating ergonomic products that can transmute to make a space more multi-dimensional (Sukanya, 2023). A functional space can be near-perfect when retrofitted with flexible products thus expanding percentage usage and demand (Arthur, Selin, Martin, & David, 2022); (Rand, Luís, & Helena, 2021).

e. Fifth Principle: Intellectual and Emotional Comfort

This principle ensures that users are emotionally and intellectually comfortable with a habitable envelope (Sareh, 2019). To this end, the building or space must have visible signages, optimal lighting,

and good visual contrast and be retrofitted with ergonomic and comfortable materials and finishings (CABE, 2024).

Vis-à-vis signages, those with visual impairment could be assisted with audio signage call-outs (Rise Vision, 2024). This is normally activated when such persons are close to the call-out device. Lighting, as a P6 pattern of biophilic design, is a critical component of internal environments (William, Catherin, & Joseph, 2014). Proper use and deployment of dynamic lighting, diffuse lighting, static warm white lighting and static cool white lighting can adequately make a space quainter and more enjoyable (Onwukwe, Ogbuokiri, & Nnabuihe, 2024). Visual contrast plays a major role in making objects, sculptures and portraits stand out from their immediate backgrounds (Aiken, 2024). This allows users to immediately focus on such points of interest that can accentuate acceptance of a space or product. Materials that are eco-friendly, easy to install and replace and cost-effective can also enhance the acceptability of a space (UCEM, 2024). Good modular coordination and effective matrix arrangement of materials can go a long way in making spaces emotionally attractive and intelligently responsive (Khushbu, Jayeshkumar, & J, 2013).

In all, an ID/Product must be broad, responsive, flexible, convenient, accommodating, welcoming and realistic to all diverse categories of users.

4. Methodology:

This explorative study employed three distinct methods to proffer a superior correlation status between the quintuple principles and existing strategies deployed in existing developments. Case studies were chosen based on the geographical diversity of the country and building

types.

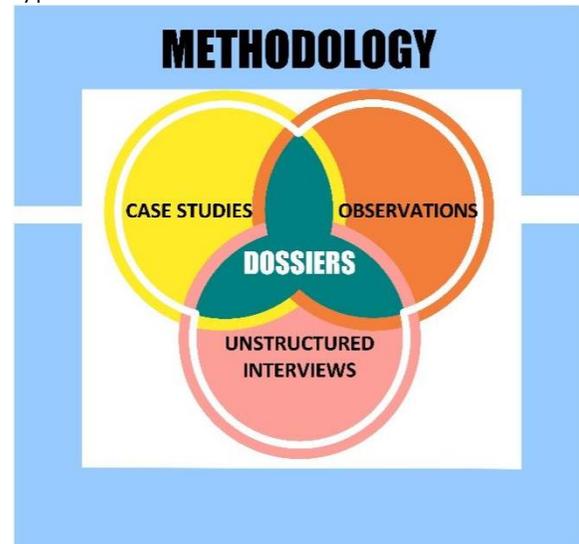


Figure 3: Methodology. Source: Authors' Fieldwork; 23rd August, 2024.

As shown in Figure 3, each ordinal dossier is a homogeneous amalgamate of case studies, unstructured interviews and observations.

Dossier 1: Kingsway Tower.

Project Location: 24 Glover Road, Ikoyi, Lagos.

Architects: SAOTA

Area: 27,832m²

Year completed: 2019

Building Type: Mixed-Use Development

Learning Experience: Impressive curtain walling system + lattice network façade that dismantles the visual barrier between the exterior and interior environments in an artistic composition.

Project Gallery:

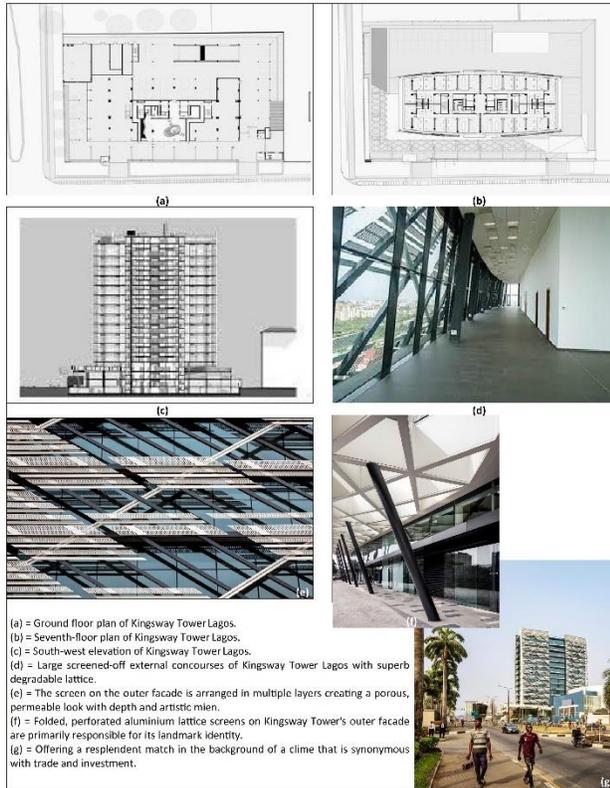


Figure 4: (a) = Ground floor plan of Kingsway Tower Lagos; (b) = Seventh-floor plan of Kingsway Tower Lagos; (c) = South-west elevation of Kingsway Tower Lagos; (d) = Large screened-off external concourses of Kingsway Tower Lagos with superb degradable lattice; (e) = The screen on the outer facade is arranged in multiple layers creating a porous, permeable look with depth and artistic mien; (f) = Folded, perforated aluminium lattice screens on Kingsway Tower's outer facade are primarily responsible for its landmark identity; (g) = Offering a resplendent match in the background of a clime that is synonymous with trade and investment. *Source: Authors' Fieldwork.*

The curtain wall system employed in the facade of the Kingsway Tower project is unitized in large sections, pre-assembled and glazed before installation to reduce the probability of on-site errors (Abdel, 2024).

The curtain wall is composed of double-glazed, high-performance glass panels that enhance energy efficiency, better insulation and reduction of heat gain thus minimizing the building's reliance on expensive air conditioning (Abdel, 2024). Interiors are relatively noise-free.

Aluminium framing employed in the curtain wall system incorporates thermal breaks (Abdel, 2024). This helps to reduce thermal conductivity, improving energy efficiency and preventing condensation on surfaces of internal glazing leaves.

Impressive structural glazing as glass membranes are bonded to aluminium frames using silicone adhesives (Abdel, 2024). This offers a sleek, frameless appearance with minimal visible metal, giving the façade a clean and modern aesthetic mien.

The project incorporates external shading devices to manage solar heat gain and glare (Abdel, 2024). There is a successful integration of these devices with the interesting curtain wall system to enhance the building's energy performance and its architectural finesse.

Some parts of the curtain wall system feature smart glass that can adjust its opacity or tint in response to sunlight thus allowing for better control of luminance and energy consumption (Abdel, 2024).

Dossier 2: Landmark Retail Boulevard.

Project Location: Water Corporation Road, Oniru Estate, Victoria Island Annex, Lagos.

Architects: ANA Design Studio Pvt. Limited

Area: 94,000m²

Year completed: 2019

Building Type: Mixed-Use Development

Learning Experience: Commitment to accessibility which reflects broader trends in modern commercial development towards ensuring that all individuals, irrespective of physical ability, can enjoy and navigate spaces unhindered.

Project Gallery:

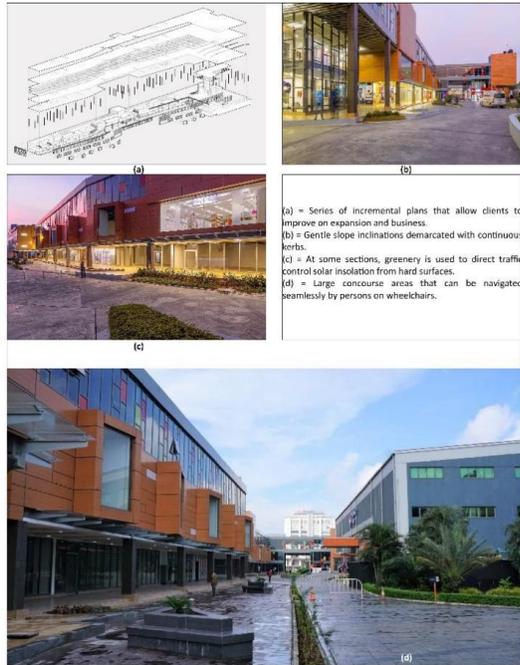


Figure 5: (a) = Series of incremental plans that allow clients to improve on expansion and business; (b) = Gentle slope inclinations demarcated with continuous kerbs; (c) = At some sections, greenery is used to direct traffic control solar insolation from hard surfaces; (d) = Large concourse areas that can be navigated seamlessly by persons on wheelchairs. Source: Authors' Fieldwork.

The ramps are fully accessible to individuals with physical challenges as the project ensured compliance with accessibility standards and guidelines (ANA Design Studio, 2021).

The gentle gradient of the ramps makes it easy for users to navigate without exerting excessive effort (ANA Design Studio, 2021). The ramp concourses can accommodate multiple-way trafficking crowds. There are also spacious turning radii for wheelchair users to facilitate smooth transitions between ramps and other pedestrian areas.

The ramps were built with non-slip materials to provide sufficient grip and surface traction in inclement weather conditions (ANA Design Studio, 2021). The ramps also provide easy access to entrances and parking lots within the complex. A

glaring observation noted was the absence of handrails and grip bars fitted along all ramp routes.

Dossier 3: Eko Tower 1.

Project Location: 1415 Adetokunbo Ademola Street, Victoria Island, Lagos 106104, Lagos.

Architects: ITB Nigeria Limited

Area: 19-storey Tower with over 7000m² of Technical Profile curtain walling.

Year completed: 2016

Building Type: Flex Space (John E. A., 2022).

Learning Experience: Commercial architecture that features a contemporary design whose entrance is celebrated with well-crafted automatic doors that support aesthetics and functional requirements. This includes granting access to users with various degrees of encumbrances.

Project Gallery:



(a) = 10th-floor plan of the Eko Tower 1.
 (b) = Well-celebrated entrance of the Eko Tower 1 Project.
 (c) = Well-celebrated entrance of the Eko Tower 1 showing bifurcated ramped access.
 (d) = Night impression of the covered and well-illuminated entrance.
 (e) = The Eko Tower 1 Project serves as another peerless addition to the ever-changing and beautiful V.I. landscape.

Figure 6: (a) = 10th-floor plan of the Eko Tower 1; (b) = Well-celebrated entrance of the Eko Tower 1 Project; (c) = Well-celebrated entrance of the Eko Tower 1 showing bifurcated ramped access; (d) = Night impression of the covered and well-illuminated entrance; (e) = The Eko Tower 1 Project serves as another peerless addition to the ever-changing and beautiful V.I. landscape. Source: Authors' Fieldwork.

Equipped with sensors that detect proximal individuals, the automatic doors ensure easy access for all users including those with disabilities (ADC Entrance Solutions, 2024). This is in sync with modern standards of ID.

Manual override options ensure that doors can be opened in case of power failure or emergencies (Total Automation, 2024). Careful observation will show that the doors blend seamlessly with the building's glazed curtain wall façade. This integration serves to propagate the building's sleek and contemporary appearance.

With minimized duration of opening and closing of the automatic doors, the building's internal climate is kept in check (Building Design, 2013). This improves energy efficiency and reduction of heating and cooling costs.

Dossier 4: Lagos University Teaching Hospital.

Project Location: Ishaga Road, Idi-Araba, Lagos 102215, Lagos.

Architects: Arc. Michael Taiwo Ogunrinde

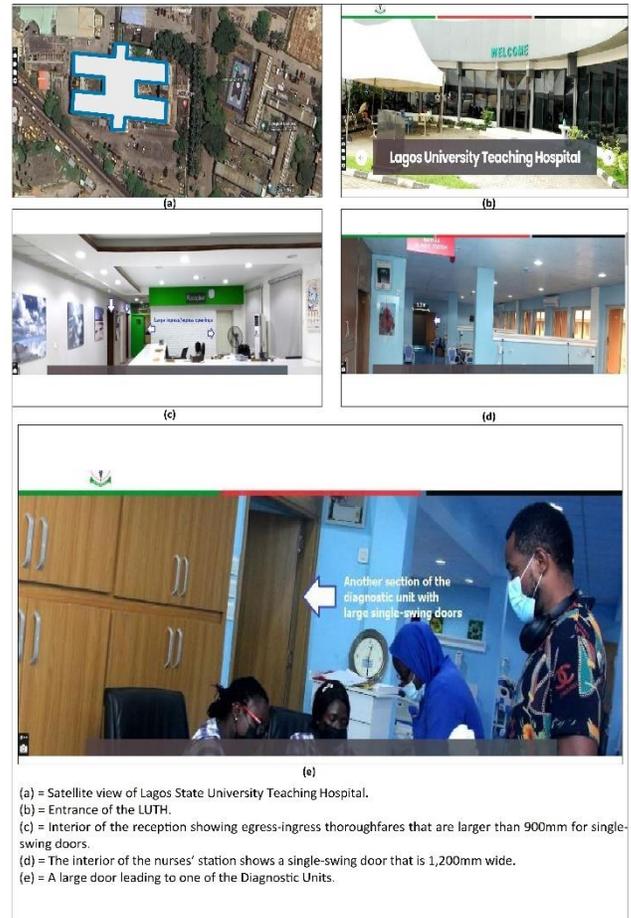
Area: 200,000m² (approx.)

Year completed: 1962

Building Type: Institutional

Learning Experience: Like many other major hospitals, Lagos State University Teaching Hospital (LUTH) features large single-swing and double-swing doors designed to withstand high volumes of traffic of diverse users including patients, medical personnel and visitors.

Project Gallery:



(a) = Satellite view of Lagos State University Teaching Hospital.
 (b) = Entrance of the LUTH.
 (c) = Interior of the reception showing egress/ingress thoroughfares that are larger than 900mm for single-swing doors.
 (d) = The interior of the nurses' station shows a single-swing door that is 1,200mm wide.
 (e) = A large door leading to one of the Diagnostic Units.

Figure 7: (a) = Satellite view of Lagos State University Teaching Hospital; (b) = Entrance of the LUTH; (c) = Interior of the reception showing egress/ingress thoroughfares that are larger than 900mm for single-swing doors; (d) = The interior of the nurses' station shows a single-swing door that is 1,200mm wide; (e) = A large door leading to one of the Diagnostic Units. Source: Authors' Fieldwork.

The hospital's stepped primary entrance is appreciably large enabling easy access for patients, visitors and staff (LUTH, 2024). They are designed to handle high volumes of users entering and exiting daily.

The reception and other public areas feature large doors which are both functional and part of the building's overall appeal (LUTH, 2024).

The nurses' station also has large single-swing doors which provide smooth access for patients on beds, wheelchairs, or with mobility aids (LUTH, 2024).

Dossier 5: Union Bank Nigeria Plc.

Project Location: Plot 243B Muri Okunola Street, Lagos.

Chief Executive Officer/Project Coordinator: Emeka Emuwa.

Area: 242.32m²

Year completed/commissioned: 8th June 2016.

Building Type: Financial Institution

Learning Experience: Accessibility for everyone irrespective of age and ability.

Project Gallery:

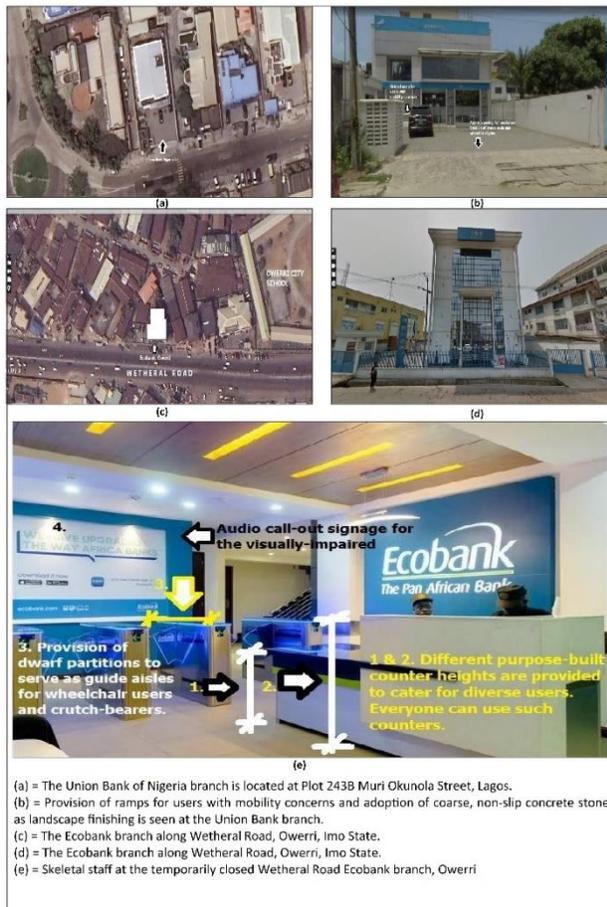


Figure 8: (a) = The Union Bank of Nigeria branch is located at Plot 243B Muri Okunola Street, Lagos; (b) = Provision of ramps for users with mobility concerns and adoption of coarse, non-slip concrete stones as landscape finishing; (c) = The Ecobank branch along Wetheral Road, Owerri, Imo State; (d) = The Ecobank branch along Wetheral Road, Owerri,

Imo State; (e) = Skeletal staff at the temporarily closed Wetheral Road Ecobank branch, Owerri. ID strategies put in place serve all persons irrespective of physical challenges. *Source: Authors' Fieldwork.*

The approach to the entrance concourse of the bank is made possible by ramps which everyone can use, including persons without disabilities. There is also very minimal chance of slipping by users with crutches and wheelchairs as traction between the mobility equipment and the surfaces of the compound is highly assured. However, massive hardscaping would create urban heat islands (UHIs) which could exacerbate solar insolation during the dry seasons (Svetlana, Bechara, Hamzé, Nassim, & Mohamed, 2021).

Dossier 6: Ecobank.

Project Location: 102 Wetheral Road, Owerri, Imo State

Area: 330.43m²

Perimeter: 77.3m

Building Type: Financial Institution

Learning Experience: Inclusiveness of diverse persons within banking halls and customer service stations.

Project Gallery:

Plates of this dossier are captured in Figures 8(c) to 8(e).

Dossier 7: Departments of Mass Communication and Humanities.

Project Location: Federal Polytechnic Nekede Owerri, Nekede, Imo State.

Area: 808.4m² (Department of Humanities)

Area: 801.82m² (Department of Mass Communication)

Building Type: Educational

Learning Experience: Accessibility of all user groups.

Dossier 8: Women's Health and Equal Rights Initiative (WHER)

Project Location: No. 422, Ado J.G. Muhammad Crescent Street, Abuja.

Architects: Arc. (Dr.) Steve Nwankwo I. (Graceplan CONSULTANTS)

Area: 255.89m²

Year completed: 2nd October, 2021

Building Type: Flex Space (John E. A., 2022).

Learning Experience: Redefining the kitchen and toilet facilities for inclusivity.

Project Gallery:

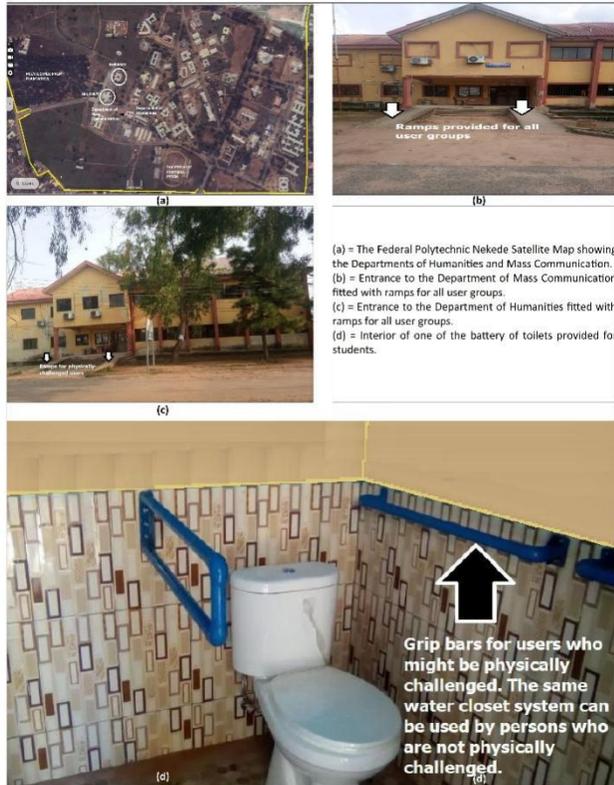


Figure 9: (a) = The Federal Polytechnic Nekede Satellite Map showing the Departments of Humanities and Mass Communication; (b) = Entrance to the Department of Mass Communication fitted with ramps for all user groups; (c) = Entrance to the Department of Humanities fitted with ramps for all user groups; (d) = Interior of one of the batteries of toilets provided for students. *Source: Authors' Fieldwork.*

As can be observed in Figure 9(d), the toilets are fitted with proximal grip bars which greatly improves the percentage usage by physically challenged persons. It must, however, be noted that the ramps graphically captured in Figures 9(b) and 9(c) do not have protective handrails.

Project Gallery:



Figure 10: (a) = A screenshot of the GPS location clearly shows the WHER office building; (b) = Site Plan of the WHER Institute; (c) = Ground Floor Plan of the WHER Institute; (d) = Inclusive strategies put

in place within the WHER Institute kitchen; (e) = Front elevation of the WHER Institute. Source: Graceplan CONSULTANTS.

As can be observed in Figure 10(b), the ground floor plan can be accessed by a ramp which leads directly into the visitors' lounge. The kitchen is designed to be accessed by persons who may be constrained to a wheelchair. Single-swing door to the kitchen measured 1.1m. See Figure 10(c).

Dossier 9: Product Development

Project Location: Department of Architectural Technology, Federal Polytechnic Nekede, Owerri, Imo State.

Fabricators: Onwukwe, Chukwuemeka O.S. and Ibemere, Livingstone C.

Year completed: June, 2023

Learning Experience: Improving efficiency factor between users, their ergonomic products and the space.

Project Gallery:

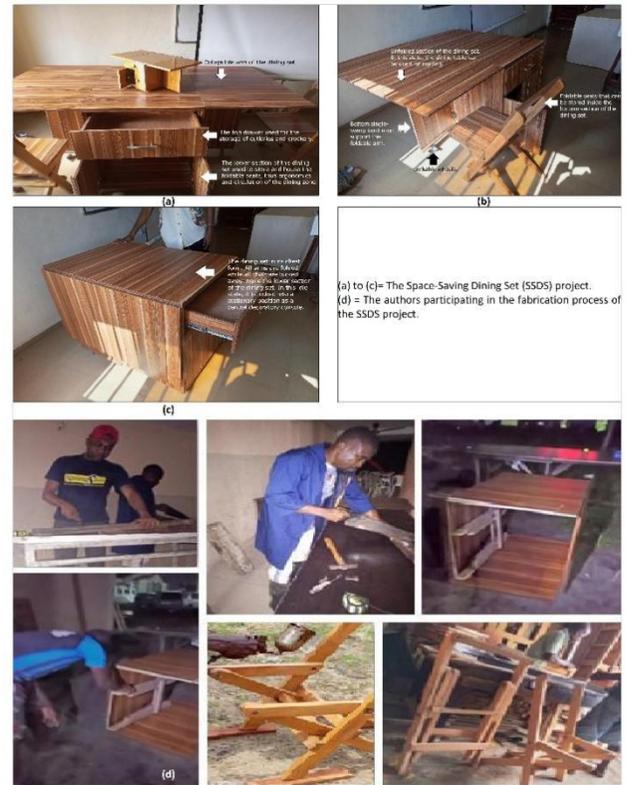


Figure 11: (a) to (c) = The Space-Saving Dining Set (SSDS) project. Source: Authors' Workshop; (d) = The authors participating in the fabrication process of the SSDS project. April, 2023. Source: Author's Product Development, June, 2023.

The dining set can transmute into a study console and a movable storage chest. All chairs are foldable and can be tucked away into an openable chest within the lower central segment of the dining table (Onwukwe & Ibemere, 2023). The dining set has 6 consoles for 6 users. Wheelchair users can also use the dining set by occupying any console that is not housing a chair. In its idle state, the dining set is locked into a stationary position and assumes the function of decorative central furniture that can support diverse interior electronics.

Dossier 10: Shoprite Owerri Mall.

Project Location: No 3 Egbu Road, Owerri, Imo State.

Client: Ketron Investment Limited.

Area: 16,129.55m².

Year completed: 31st March, 2016.

Building Type: Commercial (Retail + Non-freestanding)

Learning Experience: Forcible narratives in visible signages, optimal lighting, visual contrast and ergonomic materials/fittings.

Project Gallery:

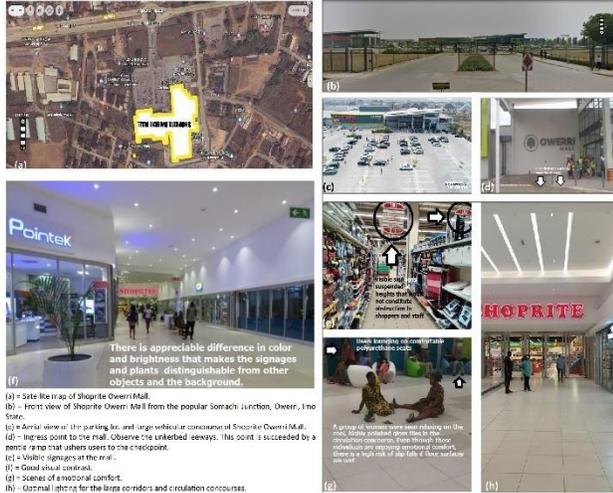


Figure 12: (a) = Satellite map of Shoprite Owerri Mall; (b) = Front view of Shoprite Owerri Mall from the popular Somachi Junction, Owerri, Imo State; (c) = Aerial view of the parking lot and large vehicular concourse of Shoprite Owerri Mall; (d) = Ingress point to the mall. Observe the unkerbed leeways. This point is succeeded by a gentle ramp that ushers users to the checkpoint; (e) = Visible signages at the mall; (f) = Good visual contrast; (g) = Scenes of emotional comfort; (h) = Optimal lighting for the large corridors and circulation concourses. *Source: Authors Fieldwork.*

The facility is located along Egbu road, off Somachi Junction, Owerri. See Figure 12.

5. Comparative Analysis of Case Studies

Comparative matrix tables are available as supplementary materials (Tables 1-5) to visualize the systematic assessment of each case study against the quintuple principles. The tables also contain an appraisal of inclusivity and user satisfaction responses.

Table 1: Matrix tables for Case Studies 1 and 2 showing ID status and User Satisfaction Responses

CASE STUDY 1: Kingsway Tower						CASE STUDY 2: Landmark Retail Boulevard						
Good	100					Good	100					
	95						95					
	90						90					
	85						85					
	80						80					
	75						75					
	70						70					
	65						65					
	60						60					
	55						55					
	50						50					
Moderate	45					Moderate	45					
	40						40					
	35						35					
	30						30					
	25						25					
	20						20					
Bad	15					Bad	15					
	10						10					
	5						5					
Inclusive Design Status (case studies + observations)	315	55	60	85	30	85	360	80	95	80	20	85
User satisfaction response (unstructured interviews)	6	1 = Very bad; 2 = Bad; 3 = Somewhat bad; 4 = Neutral; 5 = Somewhat Good; 6 = Good; 7 = Very Good; 8 = Excellent; 9 = Outstanding; 10 = Exceptional.					7	1 = Very bad; 2 = Bad; 3 = Somewhat bad; 4 = Neutral; 5 = Somewhat Good; 6 = Good; 7 = Very Good; 8 = Excellent; 9 = Outstanding; 10 = Exceptional.				

Source: Authors Fieldwork.

Table 2: Matrix tables for Case Studies 3 and 4 showing ID status and User Satisfaction Responses

CASE STUDY 3: Eko Tower 1						CASE STUDY 4: Lagos University Teaching Hospital						
Good	100					Good	100					
	95						95					
	90						90					
	85						85					
	80						80					
	75						75					
	70						70					
	65						65					
	60						60					
	55						55					
	50						50					
Moderate	45					Moderate	45					
	40						40					
	35						35					
	30						30					
	25						25					
	20						20					
Bad	15					Bad	15					
	10						10					
	5						5					
Inclusive Design Status (case studies + observations)	185	20	50	50	10	55	175	35	50	30	10	50
User satisfaction response (unstructured interviews)	4	1 = Very bad; 2 = Bad; 3 = Somewhat bad; 4 = Neutral; 5 = Somewhat Good; 6 = Good; 7 = Very Good; 8 = Excellent; 9 = Outstanding; 10 = Exceptional.					4	1 = Very bad; 2 = Bad; 3 = Somewhat bad; 4 = Neutral; 5 = Somewhat Good; 6 = Good; 7 = Very Good; 8 = Excellent; 9 = Outstanding; 10 = Exceptional.				

Source: Authors Fieldwork.



Table 3: Matrix tables for Case Studies 5 and 6 showing ID status and User Satisfaction Responses

CASE STUDY 5: Union Bank Nigeria Plc						CASE STUDY 6: Ecobank						
Good	100					Good	100					
	95						95					
	90						90					
	85						85					
	80						80					
	75						75					
	70						70					
	65						65					
	60						60					
	55						55					
Moderate	50					Moderate	50					
	45						45					
	40						40					
	35						35					
	30						30					
	25						25					
	20						20					
	15						15					
	10						10					
Bad	5					Bad	5					
		Absence of Barriers	Accessibility Factor	Adaptability	Ergonomics			Absence of Barriers	Accessibility Factor	Adaptability	Ergonomics	Intellectual and Emotional Comfort
Inclusive Design Status (case studies + observations)	300	90	75	50	25	40	205	40	40	55	20	50
User satisfaction response (unstructured interviews)	6	1 = Very bad; 2 = Bad; 3 = Somewhat bad; 4 = Neutral; 5 = Somewhat Good; 6 = Good; 7 = Very Good; 8 = Excellent; 9 = Outstanding; 10 = Exceptional.										

Source: Authors Fieldwork.

Table 5: Matrix tables for Case Studies 9 and 10 showing ID status and User Satisfaction Responses

CASE STUDY 9: Product Development						CASE STUDY 10: Shoprite Owerri Mall.						
Good	100					Good	100					
	95						95					
	90						90					
	85						85					
	80						80					
	75						75					
	70						70					
	65						65					
	60						60					
	55						55					
Moderate	50					Moderate	50					
	45						45					
	40						40					
	35						35					
	30						30					
	25						25					
	20						20					
	15						15					
	10						10					
Bad	5					Bad	5					
		Absence of Barriers	Accessibility Factor	Adaptability	Ergonomics			Absence of Barriers	Accessibility Factor	Adaptability	Ergonomics	Intellectual and Emotional Comfort
Inclusive Design Status (case studies + observations)	340	85	65	60	65	5	320	60	80	35	40	85
User satisfaction response (unstructured interviews)	7	1 = Very bad; 2 = Bad; 3 = Somewhat bad; 4 = Neutral; 5 = Somewhat Good; 6 = Good; 7 = Very Good; 8 = Excellent; 9 = Outstanding; 10 = Exceptional.										

Source: Authors Fieldwork.

Table 4: Matrix tables for Case Studies 7 and 8 showing ID status and User Satisfaction Responses

CASE STUDY 7: Departments of Mass Communication and Humanities						CASE STUDY 8: Women's Health and Equal Rights Initiative (WHER)						
Good	100					Good	100					
	95						95					
	90						90					
	85						85					
	80						80					
	75						75					
	70						70					
	65						65					
	60						60					
	55						55					
Moderate	50					Moderate	50					
	45						45					
	40						40					
	35						35					
	30						30					
	25						25					
	20						20					
	15						15					
	10						10					
Bad	5					Bad	5					
		Absence of Barriers	Accessibility Factor	Adaptability	Ergonomics			Absence of Barriers	Accessibility Factor	Adaptability	Ergonomics	Intellectual and Emotional Comfort
Inclusive Design Status (case studies + observations)	195	75	70	25	5	20	350	80	65	90	65	50
User satisfaction response (unstructured interviews)	4	1 = Very bad; 2 = Bad; 3 = Somewhat bad; 4 = Neutral; 5 = Somewhat Good; 6 = Good; 7 = Very Good; 8 = Excellent; 9 = Outstanding; 10 = Exceptional.										

Source: Authors Fieldwork.

Summary Output and ANOVA.

The summary output and ANOVA calculations are shown in Table 6 below.

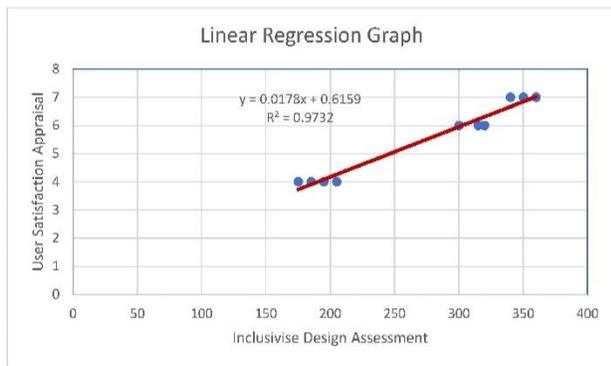
Table 6: Summary Output and ANOVA

Case studies	Inclusive Design	User Satisfaction
Case study 1	315	6
Case study 2	360	7
Case study 3	185	4
Case study 4	175	4
Case study 5	300	6
Case study 6	205	4
Case study 7	195	4
Case study 8	350	7
Case study 9	340	7
Case study 10	320	6

SUMMARY OUTPUT	
Regression Statistics	
Multiple R	0.988036684
R Square	0.973216489
Adjusted R Square	0.972818844
Standard Error	12.88971738
Observations	10

ANOVA						
	df	SS	MS	F	Significance F	
Regression	1	47736.9863	47736.99	287.3216	6.09474E-07	
Residual	7	1163.013699	166.1448			
Total	8	48900				

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	-25.34246575	17.94569098	-1.41218	0.200775	-67.7772818	17.09235034	-67.77728184	17.09235034
	6	54.24657534	3.200281801	16.95056	6.09E-07	46.67911138	61.8140393	46.67911138



(a) = Linear Regression Chart; (b) = Linear Regression Summary Output; (c) = ANOVA; (d) = Linear Regression Graph showing Trendline and Regression Formula.

Source: Authors Fieldwork.

Interpretations.

The following interpretations suffice.

- A correlation coefficient (*Multiple R*) of 0.988036684 was observed. This absolute value signifies the strong relationship between inclusive design principles and user responses to the performance of such principles.
- R^2 is 0.973216489. Rounded off to 2 digits, 97% of values fit the regression analysis model.
- The *Significance F* = 6.09474E-07. This is less than 0.05 (5%); a pointer that the results are reliable and data are statistically significant.

6. Findings

ID in Nigeria is gradually gaining traction, especially in advanced urban centres like Abuja

and Lagos. From interpretations, there is an unassailable connection between how buildings perform vis-à-vis inclusivity and user satisfaction.

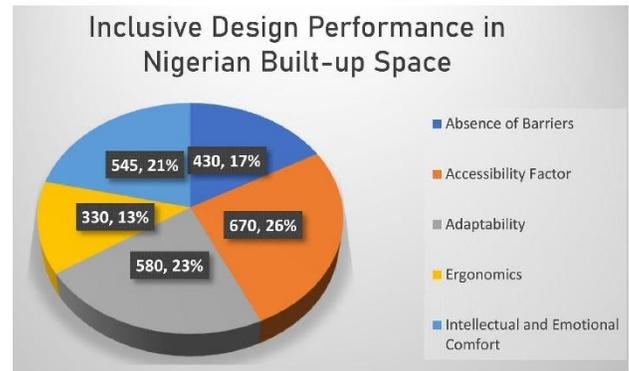


Figure 13: ID Performance in the Nigerian Built-up Space. Source: Authors' Fieldwork.

Figure 13 shows, at a glance, the performance of the quintuple principles of inclusive design in the Nigerian built-up space.

As the lowest performing principle in this study, it can be rightly said that ergonomics is still a factor yet to be fully exploited and captured in the Nigerian built-up space. In all documented dossiers, it was observed that a greater number of studied building types, completely lacked ergonomic products that could improve the functionality of the indoor space and, by extension, the diverse needs of various user groups. An appraisal score of 13% justifies this assertion.

Barriers are a major concern as most buildings studied still have marked impediments that constitute obstacles to the free movement of persons with disabilities. With a score of 17%, the absence of barriers must be vigorously pursued.

Users exhibited relative discomfort within the interiors of most building types designed for offices, educational purposes and health delivery. This could be attributed to the poor ergonomic performance of such building types. With an appraisal score of 21%, more research should be done to ascertain any possible link between users' intellectual and emotional comfort and spaces retrofitted with ergonomic products.

An adaptability assessment score of 23% indicates that most building types are retrofitted with appurtenances that do not cater for physically



challenged populations. In most case studies, especially in financial institutions, individuals with height challenges find it difficult to operate door handles, negotiate risers and steps and communicate effectively with teller officers seated behind raised counters in banking halls.

Coming in at 26%, the accessibility factor was also deemed poor as the vertical circulation of persons was left entirely to staircases and malfunctioning lifts. Even though automatic doors were installed, there were still poor sociotechnical negotiations among the operators of such doors.

In all, it can be observed that the Nigerian built-up space still deploys building types with poor inclusivity strategies. None of the principles attained a (50%) moderate appraisal score. This is a pointer, to the effect, that a lot still needs to be done to improve the inclusive design in the country, especially in ergonomics and the removal of impediments to the movement of persons with disabilities.

Data from observations and unstructured interviews point to the fact that most challenges that contribute to lag in the deployment of inclusive design strategies arise from the duo variables of professionalism and building regulations. Issues that could promote the failure of architects to effectively key into ID include:

- a. Lack of awareness and training where some architects may not be sufficiently trained in ID principles and awareness of accessibility standards,
- b. Non-participation of stakeholders such as people with disabilities, the elderly and those with specific needs in design engagements. Interviews conducted on professionals linked with project delivery did not identify any documented participatory session with intended users,
- c. Issue of attaching a lot of consideration to aesthetics over functionality. This is the major bane of failure of architects in fronting designs that are compliant with Inclusive Design. A lot of focus is devoted to creating visually appealing envelopes rather than ensuring that those structures have ergonomic spaces that are emotionally and intelligently comfortable, and

- d. Budget constraints of the project. This puts a lot of pressure on architects to see certain inclusive parameters as 'add-ons'. In most cases, these 'add-ons' are removed to reduce cost. This is observed in the near-constant pattern of escalated issues of fall risks in most of the provided ramps.

Building Regulations have a significant impact on the failure or success of ID. ID registers near failure when:

- a. Building codes and regulations are obsolete and fail to address the modern accessibility concerns of users,
- b. Building regulations only target minimal requirements such as the inclusion of ramps (Andersson, 2021). Other aspects of inclusivity are either neglected or completely ignored. These include tactile signage, audio callout signage and wayfinding systems,
- c. Inconsistent enforcement and, in most cases, near non-enforcement of building regulations (Thompson, 2024). This issue has been on the front burner of several conferences in the Built Environment towards the endless pursuit of offering solutions to approving poorly designed structures and building collapse, and
- d. Cost-focused regulations that prioritise cost efficiency over inclusivity.

7. Recommendations

Based on the analysis and findings from the case studies, unstructured interviews and observations of inclusivity strategies adopted in all documented dossiers, the following recommendations suffice:

- a. The nation's building codes should be revised to incorporate the quintuple principles. This will ensure that inclusivity becomes a standard requirement for new developments.
- b. Continuing Professional Development (CPD) programmes ensure a structured avenue through which professional architects maintain, develop and sustain their capacity for efficient and effective service delivery (Architects' Council of Europe, 2024), (Chukwuma-Uchegbu & Ekpo, 2023). Apart from creating more CPD-inclusive design content, these



programmes should be mandatory for license renewals. This way, professional architects will be expected to meet the acceptable benchmarks for re-training for licensure. This should replace the subsisting status of satisfying only outright payments for license renewals.

- c. The pattern of handling ID schedules as an afterthought should be discouraged by architects. Rather, they should be considered right from the onset of planning. User-participatory Design (UD) must be encouraged and broadened to capture responses from persons living with disabilities, senior citizens and children during consultation and planning sessions.
- d. Retrofitting programs should be set up and carried out for older facilities and public spaces not designed and built for inclusivity. Such programs include the provision of ramps, removal and installation of wide doorways, improvements on signage to consider those with sight and audio perception challenges and installation of products that can ease the use of conveniences.
- e. Continuous Post-occupancy Assessment (CPA), feedback and collation of usage data from users of various backgrounds can help improve existing guidelines on the design of public facilities and layouts.

8. Conclusion

The perusal of principle-based case studies within Nigeria's urban milieu reveals issues and opportunities for advancing inclusive design. In a country marked by rapid citification and social diversity, ID becomes crucial in creating habitats that accommodate all individuals, regardless of age, ability, or socio-economic status.

Findings from these case studies underscore the importance of adhering to key concepts of ID, including equitable use, flexibility, and accessibility. In the Nigerian context, a lacuna exists in the consistent application of these principles, particularly in public and residential areas where accessibility features are often ignored, limiting participation and quality of life for people with disabilities and other disparaged groups.

Furthermore, the involvement of local communities in the design procedure has proven vital in birthing spaces that respond effectively to users' explicit needs. Incorporating participatory design methods ensures that design solutions reflect the lived encounters of the people who use these spaces, promoting a sense of proprietorship and inclusion.

As Nigeria continues to develop its infrastructure, a commitment to ID can warrant a future where projects can promote social equity and enhance the well-being of all citizens. By leveraging the lessons learned from the dossiers, stakeholders in the Built Environment can implement measures that support a more inclusive, resilient, and human-centered burghal landscape across the nation.

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