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Enhancing Circulation and Wayfinding in Public Buildings in Port Harcourt

Mmom. S. C

MSc Student, Department of Architecture, Rivers State University, Nigeria.

PAUL. U

Lecturer, Department of Architecture, Rivers State University, Nigeria

Abstract

Effective circulation and wayfinding are fundamental to functional, safe, and inclusive public buildings. This study investigates design strategies and interventions to enhance circulation and wayfinding in two representative public buildings in Port Harcourt. Port Harcourt International Airport (New International Terminal, Omagwa) and the Rivers State Secretariat Complex (Point Block & Secretariat buildings). Combining literature on environmental wayfinding, evidence-based design, and a contextual analysis of the selected buildings. Using a mixed-methods approach (documentary analysis, site observations, and precedents from wayfinding literature), this paper identifies principal circulation bottlenecks, signage and information gaps, and proposes a layered wayfinding strategy tailored to Port Harcourt's built context. Recommendations cover spatial layout changes, signage hierarchy, color and graphic systems, universal accessibility, and digital wayfinding integrations. Findings demonstrate that modest but systematic interventions applied at the architectural, graphic, and operational levels can significantly reduce wayfinding time, user stress, and operational inefficiency in high-use public buildings.

Keywords*: Wayfinding, circulation, signage, Port Harcourt, airport, government complex, accessibility, environmental design, cognitive mapping.*

1. INTRODUCTION

1.1 Background and Problem Statement

Circulation and wayfinding represent core aspects of architectural design that determine how effectively people navigate and use public buildings. According to Passini (1984), wayfinding is a cognitive process that allows individuals to understand spatial organization and make movement decisions. Lynch (1960) further emphasized that legibility how easily a building or environment can be read, directly influences user experience, efficiency, and comfort.

In Port Harcourt, a rapidly urbanizing city in Nigeria, public buildings such as government facilities, hospitals, and commercial complexes often struggle with poorly planned circulation routes, confusing signage, and overcrowded halls. Enhancing circulation and wayfinding is critical to improving safety, accessibility, and user satisfaction in these facilities. This research focuses on two notable public buildings in Port Harcourt. Port Harcourt International Airport (PHC, Omagwa) and the Rivers State Secretariat Complex. To evaluate their circulation systems and propose design improvements.

1.2 Research Aims and Questions

The study aims to:

1. Review key theoretical principles of wayfinding and circulation in public buildings.
2. Assess the circulation and wayfinding characteristics of the two case-study buildings in Port Harcourt
3. Propose practical, evidence-based interventions adapted to local constraints.

Research questions include:

1. What are the primary factors affecting wayfinding and circulation in the selected buildings?
2. How do architectural layout, signage, graphic systems, and operations interact to support (or hinder) wayfinding?
3. What staged interventions (architectural to digital) are most feasible and effective for Port Harcourt's context?

2. LITERATURE REVIEW

2.1 Concept of Circulation and Wayfinding

According to Ching (2007), circulation is the path of movement through space. It includes horizontal circulation (corridors, lobbies, halls) and vertical circulation (stairs, elevators, ramps). Good circulation increases efficiency, reduces congestion, and enhances safety. Passini (1996) describes wayfinding as decision-making that is influenced by signage, visibility, spatial cues, and mental mapping. Arthur & Passini (1992) highlight three core components:

- Decision-making
- Orientation
- Information processing

2.1 Theoretical Framework

Kevin Lynch's Theory of Legibility (1960). The Image of the City, introduced the concept of urban legibility. How easily people can form a mental image of their environment using elements such as paths, edges, districts, nodes, and landmarks. Legible spaces reduce cognitive load and improve navigation. Lynch's framework is widely used at building and campus scales to evaluate spatial clarity.

2.2 Wayfinding as an Interdisciplinary Design Problem

Therapeutic Wayfinding encompasses architecture (spatial configuration), graphic design (signage and symbols), and human factors (perception, cognition, language). Arthur and Passini's work stresses the interplay of these three elements and argues for an integrated approach to designing wayfinding systems rather than retrofitting signs after construction. Their principles clear decision points, consistent language and symbols, progressive disclosure of information are central to modern wayfinding design.

2.3 Evidence-based Insights

Recent empirical studies (including virtual testing and physiological measures) confirm that color-coding, high-contrast graphics, and architectural cues (long sightlines, differentiated textures, daylighting) significantly improve wayfinding performance in complex facilities such as hospitals and airports. Over-signage can create information overload. Conversely, well-integrated environmental cues reduce reliance on signs and decrease navigation errors.

2.4 Wayfinding in High-stress Contexts

Research in healthcare settings shows wayfinding needs distinct treatment for vulnerable and stressed users: simplified decision nodes, human assistance points, and redundancy (signs + landmarks + staff). Lessons translate well to airports and government complexes where users may be anxious or time-pressed.

2.5 Digital Wayfinding and Hybrid Systems

Digital tools such as interactive kiosks, mobile wayfinding apps, QR-code-triggered maps complement physical signage, particularly in multi-level terminals. However, digital systems must be planned alongside graphic and architectural strategies to avoid inconsistent messaging and unequal access (not all users carry smartphones).

3. METHODOLOGY

3.1 Approach Overview

The research follows a mixed-methods approach:

1. Documentary analysis: publicly available plans, articles, and official sources about Port Harcourt International Airport (PHC) and Rivers State Secretariat were reviewed.

2. Literature synthesis: core wayfinding texts (Lynch, Arthur & Passini) and recent peer-reviewed studies on signage, color, and digital wayfinding were synthesized to create an evidence base.

3.2 Case Selection Rationale

Adaptive The Port Harcourt International Airport (PHC) and the Rivers State Secretariat Complex are selected because they are high-traffic public buildings that combine complex functional requirements (security, administration, intermodal movement) and are emblematic of Port Harcourt's public architecture. PHC's new international terminal (commissioned 2018) represents a contemporary transport facility with modern interiors and potential for systematic wayfinding. The Rivers State Secretariat (a multi-block government complex) represents an older, large-scale administrative typology with legacy wayfinding challenges.

4. CASESTUDIES

4.1 Case Study 1: Port Harcourt International Airport (PHC)

Port Harcourt International Airport (IATA: PHC), located at Omagwa, serves domestic and international passengers and is a major transport hub for the Niger Delta region. The modern international terminal commissioned in October 2018 features a two-story configuration with public arrival and departure functions distributed across levels: arrivals processes (baggage claim, customs, immigration) on the ground floor and departure check-in and pre-security spaces on the upper level, with boarding via gates and passenger boarding bridges. The facility benefits from large, well-lit volumes, clear primary circulation axes, and contemporary finishes.

Figure 1: Terminal interior
Source: Federal Airports Authority of Nigeria (FAAN).

Design Highlights

1. Observed wayfinding Strengths

Clear primary axes and large volumes: the international terminal's atrium and long sightlines support legibility (users can see distant decision points like check-in banks and security constraints). Large windows and high ceilings aid orientation.

Modernized infrastructure: the new terminal includes contemporary fixtures (multiple check-in counters, immigration desks, baggage carousels), enabling operational streamlining.

2. Identified wayfinding and circulation issues

Terminal separation and inter-terminal transfer: Port Harcourt still uses separate domestic and international terminals.

Movement between these can be confusing for infrequent users requiring clear inter-terminal transfer guidance. Travel guides emphasize the need to plan for transfers.

Signage consistency and language: photographic and secondary sources indicate standard signage exists but may lack consistent hierarchies (size, color, pictogram usage). Without uniform signage, users depend on staff or static maps.

Secondary decision points: within circulation corridors (security queues, immigration), additional decision nodes (e.g., bag drop, lounge access) can create temporary bottlenecks if not visually legible or if queuing configurations are ambiguous. This is typical in airports and confirmed by wayfinding healthcare/transport studies that emphasize the need for progressive disclosure at decision points.

3. Recommendations for PHC

A. Signage hierarchy and graphic standardization: Develop a terminal-wide signage manual (typefaces, pictograms, panel sizes, color palettes, mounting heights) to ensure consistent, system-wide messaging. Use internationally recognized airport symbols for language independence (pictograms for baggage claim, customs, toilets, gates). Arthur & Passini's

integrated approach should guide the process.

- Establish a three-tier sign hierarchy:
- External arrival cluster signs (parking, drop-off, terminal names) large, visible from approaches.
- Primary interior directional signs (check-in, security, gates) high-contrast, suspended for long sightlines.
- Secondary decision-point signage (gate numbers, lounges, restrooms) placed at eye level near decision nodes with pictograms and short text.

B. Color and contrast strategy: Use color coding for major passenger flows (e.g., green for arrivals, blue for departures, orange for transfers). High-contrast typography greatly increases legibility under variable lighting. An evidence-backed approach from contemporary studies.

C. Architectural cues and floor patterns: Introduce subtle floor patterning or tactile bands to indicate primary pedestrian routes (helps visually impaired users and reduces dependence on overhead signs). Use durable, slip-resistant materials appropriate for tropical climates.

D. Information nodes and human assistance: Place staffed information

desks at primary decision nodes (entrance, check-in hall, arrivals exit). Airport contexts benefit from human wayfinding complements, particularly for first-time travelers.

E. Digital wayfinding: Introduce kiosks with simple touch-maps and QR codes linked to mobile-friendly terminal maps. Ensure digital maps replicate the signage language/pictograms for consistency. Avoid over-reliance on digital-only solutions. Ensure redundancy for non-smartphone users.

F. Operational changes: Reconfigure queuing and temporary barriers to maintain clear sightlines to key destinations (security, check-in). Train frontline staff in wayfinding protocols and consistent verbal instructions.

Expected impact: These measures reduce search time for gates and services, lower stress levels, and streamline passenger flows, especially during peak periods. Evidence from airport and healthcare wayfinding research supports the effectiveness of combined architectural and signage interventions.

4.2 Case Study 2: Rivers State Secretariat Complex

The Rivers State Secretariat Complex in Port Harcourt is a multi-block government administrative center containing departmental offices, meeting halls, and public service counters. The complex includes the Point Block building. A tall administrative tower and several elongated low- to mid-rise blocks which present classic challenges of wayfinding: repetitive floor plates, long corridors, multiple entrances, and a high volume of first-time visitors seeking diverse services.

Figure 2: Rivers State Secretariat Building Exterior
Source: Wikimedia Commons. (n.d.).

Design Highlights

1. **Observed wayfinding strengths**

   Distinct external massing: the Point Block tower acts as a landmark and can be used as an orientation anchor for visitors approaching from various directions.

2. **Identified wayfinding and circulation issues**

A. Multiple entrances without clear function: Visitors are often unsure which entrance serves which department. Reception and queuing functions can be unclear. This forces ad-hoc routing and staff intervention.

B. Repetitive interior layouts: Long corridors with repeated door rhythms make floor reorientation difficult. Signage is often limited to departmental nameplates with little directional hierarchy.

C. Accessibility gaps: Older buildings may lack clear ramps, tactile indicators, and elevator signage tailored for people with disabilities. Legacy buildings are prone to inconsistent compliance with universal design principles.

3. **Recommendations for the Rivers State Secretariat**

A. Campus-level orientation: Create a primary central plaza or orientation courtyard (or clearly designate an existing plaza) as the visitor's first "node" with a prominent wayfinding kiosk (district map, departmental index, and "You are here" marker). This leverages the land marking power of the Point Block and anchors visitor circulation.

B. Entrance function differentiation: Assign specific public-facing functions to particular entrances and visually differentiate them (distinct awnings, color-coded canopy bands, pavement color) so visitors intuitively select the correct entry for their need (e.g., permits, tax, public complaints).

C. Departmental zoning and signage: Reorganize departmental signage into zones (e.g., Administrative, Public Services, Legal) and apply color-coding and pictograms across directories, corridor signage, and elevator signage. This reduces cognitive load when navigating repetitive floor plates.

D. Internal landmarks and visual breaks: Introduce internal landmarks such as art, distinctive seating, planters, or feature lighting at corridor intersections to differentiate otherwise similar spaces. Lynch's nodes and landmarks concept is particularly applicable in repetitive government corridors.

E. Accessibility retrofit: Upgrade entrances with accessible ramps and tactile paving. Install audible indicators at elevators and clear tactile maps at the main kiosk for visually impaired visitors. These measures are both legal best practice and improve universal usability.

F. Staff and operational measures: Institute a front-line concierge/greeter during peak hours and provide staff with departmental routing cards to direct visitors quickly.

G. Expected impact: By creating a districted, color-coded system and strengthening the primary visitor node, the Secretariat can significantly reduce misdirected visitors, queueing at incorrect counters, and time wasted

locating offices. These interventions require relatively modest capital investment but yield high operational returns.

5. ANALYSIS AND COMPARATIVE INSIGHTS

5.1 Common issues across case studies

Both PHC and the Secretariat share common wayfinding problems: lack of a consistent signage system, underused architectural landmarks, unclear transfer/arrival sequencing, and accessibility gaps. Differences arise in scale and operational dynamics: airports experience high flux and require internationalized pictograms and queue management, while government complexes need clear service zoning and long-term accessibility retrofits.

5.2 Evidence-based priorities for Port Harcourt public buildings

A. Signage system standardization is the greatest low-cost, high-impact intervention: a unified manual applied across building typologies reduces confusion. Arthur & Passini's cross-disciplinary model supports this priority.

B. Architectural cue enhancement (landmarks, floor patterning) reduces over-reliance on signs and aids those under stress or with language barriers (important in Port Harcourt's linguistically diverse population). Lynch's imageability principles provide a clear framework.

C. Layered redundancy by combining signs, staff assistance, and digital tools is key to resilient wayfinding systems. Research in healthcare and transport indicates redundancy reduces errors and improves user confidence.

6. DESIGN GUIDELINES AND IMPLEMENTATION ROADMAP

6.1 Ten practical design guidelines for Port Harcourt public buildings

- Adopt a signage style guide: typography, iconography, materials, mounting heights, illumination levels. (Short-term)

- Create a primary visitor node (plaza or lobby kiosk) with maps and staff. (Short-term)

- Use color-coding consistently across campus or terminal flows (arrivals vs departures, zones). (Short-term)

- Introduce tactile floor indicators and ramps for universal access. (Medium-term)

- Install high-contrast signs with pictograms and minimal text at decision points. (Short-term)

- Reconfigure queuing and temporary barriers to maintain sightlines to

key destinations. (Operational, short-term)

- Add permanent landmarks at corridor intersections (art, planter islands, and lighting) to differentiate spaces. (Medium-term)

- Deploy simple digital wayfinding aids (QR-coded static maps for mobile). (Short-term)

- Train front-line staff as wayfinding agents with standard routing scripts. (Short-term)

- Monitor and iterate: collect user feedback (surveys, timed wayfinding trials) and refine systems every 12–18 months. (Ongoing)

6.2 Implementation roadmap (phased)

- Phase 1 (0–6 months): Signage manual, primary information kiosks, staff training, and queuing reconfiguration.

- Phase 2 (6–18 months): Color-coded zoning, tactile floor installations, landmark interventions, digital QR maps.

- Phase 3 (18–36 months): Larger architectural adjustments (new ramps, reconfigured lobbies), full digital wayfinding rollout, ongoing monitoring.

6.3 Costs and Governance

Costs vary by scale: signage and kiosks are relatively low-cost and fit within routine maintenance budgets. Architectural retrofits require capital planning. Governance should be centralized e.g., a Wayfinding Design Committee comprising architects, graphic designers, building managers, and disability advocates to ensure coordinated roll-out.

7. CONCLUSION
4. DISCUSSION

Enhancing circulation and wayfinding in Port Harcourt's public buildings requires an integrated approach that merges architecture, graphic design, and operations. The Port Harcourt International Airport and Rivers State Secretariat exemplify two typologies where relatively modest interventions, signage standardization, creation of primary information nodes, color-coding, tactile cues, and staff-assisted wayfinding can yield immediate improvement. Over time, combining these with digital aids and architectural retrofits will create more legible, inclusive, and efficient public buildings in Port Harcourt. The design recommendations provided are implementable in phased steps and draw upon robust international evidence while being adapted to the local context.

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