



UNLOCKING URBAN DYNAMICS USING GIS TO EXPLORE PROPERTY USE CONVERSIONS IN PORT HARCOURT FOR DETAILED PROPERTY RECORD

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ABSTRACT: *Rapid urban growth, shifting market demand, and weak development control are intensifying property use conversions in many African cities, reshaping neighbourhood structure and challenging planning systems. In Port Harcourt, areas originally planned with clear residential-commercial separation, particularly Government Reserved Area (GRA) Phases 1, 2, and 3, are experiencing increasing conversion of residential properties into commercial and mixed-use functions. This study applies Geographic Information Systems (GIS) to analyse the spatial pattern and intensity of property use conversions across Port Harcourt and Obio/Akpor Local Government Areas. A mixed-method approach combining field observation, GPS-based mapping, and cadastral and zoning records was integrated within a GIS environment. Spatial analyses reveal that conversions are strongly corridor-driven and spatially clustered along major routes such as Woji Road, Evo Road, King Perekule Street, and Tombia Extension. A total of 604 commercial properties were identified, dominated by retail, office, and hospitality uses. The findings align with bid-rent, uneven development, and rent-gap theories, highlighting infrastructure pressure and zoning conflicts. The study demonstrates GIS as a critical tool for monitoring conversions, strengthening property records, and supporting sustainable urban management.*

KEYWORDS: Geographic Information Systems (GIS); Property Use Conversion; Residential-to-Commercial Conversion; Land Use Change; Spatial Clustering



INTRODUCTION

Urban areas are constantly evolving, shaped by economic, social, and policy-driven forces that influence land use and development. One of the most notable transformations in cities is the conversion of properties from one use to another. Alonso (1964) first explored how land use changes are driven by economic forces, while Harvey (1973) examined the broader spatial and social consequences of urban transformation. Lynch (1981) further emphasised the importance of understanding urban form and its adaptability over time. These theoretical foundations establish property use conversion, particularly the shift from residential to commercial and mixed-use functions, as a defining feature of contemporary urban expansion.

In Nigeria, the rapid transformation of land use patterns has accelerated. As observed by Wechie (2024), Port Harcourt, originally designed with distinct residential and commercial zones, has experienced significant shifts, particularly within its Government Reserved Areas (GRAs).

In Nigeria, urban expansion and the transformation of land use patterns have accelerated in recent years. Cities in Nigeria have continued to experience property use conversion. Wechie (2024) observed that Port Harcourt which was originally designed as a planned city with distinct residential and commercial zones has also witnessed significant shifts in property use. The city has experienced rapid changes in land use, particularly in its Government Reserved Areas (GRAs).

The Port Harcourt GRAs were initially established as exclusive residential neighbourhoods with some complementary commercial use for government officials and high-income earners. However, as economic activities expanded and commercial demand increased, property owners began converting residential buildings into commercial establishments.

These changes are not limited to a single administrative area but span across two local government jurisdictions: Port Harcourt Local Government Area (PHALGA) and Obio/Akpor Local Government Area (OBALGA). PHALGA, which encompasses the central business districts, has seen a higher concentration of commercial conversions, while OBALGA, traditionally a suburban area, has also experienced increased urbanisation due to its proximity to the city centre. Owei, Ede, and Obinna (2010) highlighted how these conversions have contributed to increased traffic congestion, growing pressure on urban infrastructure, and increased property values and rental market instability if unchecked (Ebube and Emoh, 2022).

A spatial analysis of these changes is necessary to understand the patterns and implications of property use conversions for informed and adequate property records. Longley, Goodchild, Maguire, and Rhind (2015) emphasized the role of Geographic Information Systems (GIS) in mapping and analyzing urban transformations, enabling planners and estate managers to make data-driven decisions.

This study applies GIS techniques to examine property use conversions in Port Harcourt GRA Phases 1, 2, and 3, spatially identifying commercial properties and analyzing their distribution patterns across the study area. By integrating field observation, GPS-based mapping, and cadastral records within a GIS environment, the research provides a data-driven assessment of the extent, clustering, and corridor-driven nature of residential-to-commercial conversions. The study evaluates the spatial, economic, and regulatory implications of these transformations, highlighting zoning conflicts, infrastructure pressures, and shifting real estate dynamics.



Through this approach, it establishes a geospatial framework for monitoring land use change, strengthening property records, and supporting evidence-based urban planning and sustainable land-use management in Port Harcourt and comparable Nigerian cities.

LITERATURE REVIEW

Urban Dynamics and Property Use Conversions: Theoretical Perspectives

Urban dynamics refer to the continuous transformation of cities driven by population growth, economic restructuring, infrastructure development, and policy change (Batty, 2013; Batty, 2021). Property use conversions, particularly the shift from residential to commercial land use, represent a central mechanism of urban transformation, shaped by land value differentials, zoning regulations, and market forces (Alonso, 1964; Harvey, 2012). Theories of urban land use and spatial organization provide a conceptual lens through which these processes can be understood, demonstrating how economic logic and capital flows influence spatial restructuring (Harvey, 2010).

One of the earliest and most influential frameworks for explaining urban spatial structure is Alonso's (1964) bid-rent theory. The theory posits that land users compete for space based on their capacity to pay rent, with commercial enterprises typically outbidding residential users for accessible, high-visibility locations near urban cores. In the context of Port Harcourt's GRAs, escalating commercial demand and rising land values have intensified this competitive dynamic, driving residential-to-commercial conversions along major corridors. The clustering of businesses along Woji Road, Evo Road, and King Perekule Street reflects classic bid-rent behaviour, where accessibility and economic visibility translate directly into higher land-use intensity (Alonso, 1964; Batty, 2013).

Complementing this economic perspective, Harvey's (2010) theory of uneven development explains how capitalist urbanization produces spatial inequalities and functional restructuring within cities. Harvey argues that as urban economies expand, capital seeks its most profitable spatial expression, prompting property owners to convert residential buildings into higher-yield commercial uses (Harvey, 2012). The rapid transformation of GRA Phases 1, 2, and 3 illustrates this process, where capital reinvestment and speculative pressures reshape formerly low-density residential districts into commercial hubs. This interpretation aligns with Batty's (2013) urban growth model, which conceptualizes cities as complex adaptive systems in which economic and spatial interactions continually reorganize urban form.

The concentric zone model originally proposed by Burgess in 1925 (reprinted in Burgess, 2015) provides an additional classical perspective on urban spatial restructuring. Burgess conceptualized cities as expanding outward in rings, with commercial functions gradually encroaching upon residential zones. Although developed in the early twentieth century, this foundational model remains analytically relevant, offering a historical lens through which contemporary residential-to-commercial transitions in Port Harcourt can be interpreted. The progressive outward commercialization observed in the GRAs reflects this enduring spatial logic, albeit within a modern, market-driven urban context.

Another relevant perspective is the concentric zone model by Burgess (2015), which explains urban expansion in rings, with commercial activities gradually encroaching into formerly



residential zones. This model provides a useful framework for understanding the spatial shifts occurring in Port Harcourt's GRAs, where once-exclusive residential areas are now becoming commercial hubs (Burgess, 2015). Similarly, contemporary studies on urban structure show that many growing cities across the world are shifting from monocentric to polycentric spatial configurations, where multiple employment, commercial, and service centres emerge beyond a single central business district. Recent research by Zhu and Niu (2024) used spatial interaction methods and GIS to identify multiple urban nuclei in expanding cities, demonstrating how sub-centres develop and redistribute economic functions away from a dominant CBD pattern also evident in Port Harcourt as new commercial clusters emerge beyond the traditional city core (Zhu & Niu, 2024).

Beyond economic and spatial models, sociological theories also offer insights into property use conversions. Smith (1996) introduced the rent gap theory, which argues that land-use changes occur when the potential rent from commercial use exceeds the existing residential rent. This explains why property owners in Port Harcourt's GRAs are converting their homes into businesses, as commercial rents continue to rise (Smith, 1996). Additionally, Zukin (2020) highlighted the role of cultural and consumer trends in shaping urban transformations, as increased demand for retail, hospitality, and office spaces fuels commercial conversions in contemporary cities.

GIS in Land Use Planning and Property Management: Case Studies and Applications

The use of Geographic Information Systems (GIS) in land use planning and property management has grown significantly, offering data-driven insights into urban transformations. GIS enables spatial analysis of property use changes, helping planners and estate managers make informed decisions regarding zoning compliance, infrastructure capacity, and market trends (Longley et al., 2015; Kresse & Danko, 2012). Numerous case studies demonstrate the effectiveness of GIS in monitoring, analysing, and managing urban growth dynamics.

Yeh and Li (2001), in Hong Kong, utilised GIS to track land use conversions and identify commercialisation hotspots, revealing that high-density commercial developments clustered along major road corridors — a pattern similarly observed in Port Harcourt's GRAs. Likewise, Aljoufie et al. (2013), analysing urban expansion in Jeddah, Saudi Arabia, found that commercial growth followed a decentralised pattern consistent with Harris and Ullman's multiple nuclei model, highlighting the spatial restructuring tendencies of expanding cities.

Across African cities, GIS applications have provided critical insights into property use transformations and regulatory compliance. In Dar es Salaam, Simon and Ngereja (2025) employed GIS and remote sensing to map long-term informal settlement growth and land use change, demonstrating how rapid urban expansion combined with weak planning enforcement facilitated unregulated land conversion — a challenge also evident in Port Harcourt. Similarly, Mwaura and Odera (2021), studying Nairobi City County, used GIS to assess compliance with development plans and found that uncontrolled commercial expansion frequently occurred outside designated zones, increasing pressure on infrastructure and services.

Beyond land use monitoring, GIS has become central to real estate valuation and investment decision-making. Kresse and Danko (2012) show that GIS-based property databases enable estate managers to evaluate rental trends, land value differentials, and investment risks with greater spatial precision. In the Nigerian context, Adeparusi (2024) demonstrates how GIS and



remote sensing have been applied in Lagos to monitor land use change and zoning compliance, reinforcing the importance of spatial technologies in regulatory enforcement.

Collectively, these studies demonstrate that GIS and remote sensing possess strong capacity for monitoring urban expansion, detecting land-use transitions, identifying emerging commercial hotspots, and supporting forecasting of spatial change processes over time (Dhanaraj et al., 2021; Wang et al., 2021). This body of evidence reinforces the methodological position that GIS provides an effective and scalable framework for analyzing, regulating, and anticipating urban transformation — a foundation upon which the present study builds.

Existing Research on Urban Transformation and Use Conversion

Several studies have examined urban development trends in Nigerian cities, particularly focusing on land-use change, property market dynamics, and infrastructure pressures associated with rapid urban growth. For instance, Akinmoladun and Oduwaye (2017) analysed land-use change and urban development control challenges in rapidly growing Nigerian cities and found that commercial expansion has frequently outpaced planning regulations, resulting in widespread residential-to-commercial property conversions and infrastructural strain. Their study highlights the persistent gap between statutory planning frameworks and market-driven land-use decisions, underscoring the need for stronger zoning enforcement and proactive infrastructure investment to manage evolving urban land-use patterns.

Studies on urban land-use change in Port Harcourt indicate a growing demand for commercial activities within neighbourhoods originally planned for residential use. Drawing on an empirical assessment of a residential district in Port Harcourt, Ayotamuno, Gobo and Owei (2010) documented a progressive conversion of residential properties to commercial uses, particularly along major access roads and high-visibility corridors. Their findings show that increasing land values, accessibility advantages, and the pursuit of higher economic returns have encouraged property owners to repurpose residential buildings for retail, office, and functions. The study further highlights how market pressures and inadequate enforcement of planning regulations have accelerated residential-to-commercial conversions, contributing to the transformation of established residential areas into mixed-use and predominantly commercial zones.

Studies of neighbourhood commercialization and “upscaling” in rapidly urbanizing cities show that while property-use conversions can create new economic opportunities, they are also commonly associated with rising rents, displacement pressures on long-term residents, and increased congestion/competition for street space and parking (Zuk et al., 2018). These outcomes align with wider global urban trends noted by Citaristi, I. (2022), which stresses the need for balanced urban development strategies that support economic growth while protecting residential liveability and inclusion.

Despite these valuable contributions, a critical gap remains in understanding the spatial dynamics of property use conversions within Port Harcourt’s GRAs. Although previous studies (Wechie & Kakulu, 2024) have identified the increasing trend of commercialization, they have relied primarily on descriptive and survey-based approaches rather than empirical GIS-driven spatial clustering analysis. As a result, the corridor-driven intensity, hotspot formation, and spatial concentration patterns of residential-to-commercial conversions remain insufficiently examined. This study fills that critical gap by applying rigorous GIS-based spatial analytical techniques to quantify the extent of property conversions, identify clustering patterns, and



GRA Phases 1, 2, and 3 are strategically positioned within two local government areas: Port Harcourt Local Government Area (PHALGA) and Obio/Akpor Local Government Area (OBALGA). PHALGA, covering the more urbanized sections, has experienced a higher concentration of commercial activities, while OBALGA, traditionally suburban, is witnessing rapid urbanization and commercialization due to its proximity to the city centre.

The GRAs are characterized by well-planned road networks, large plots of land, and modern infrastructure, making them attractive for commercial ventures such as hotels, corporate offices, restaurants, shopping centres, and entertainment hubs. Key commercial corridors include Woji Road, Evo Road, Tombia Street, and King Perekule Street, where formerly residential properties have been converted into business establishments.

Data Collection and Analysis

This study employs a mixed-methods approach to data collection and analysis, integrating both primary and secondary data sources to examine property use conversions in Port Harcourt GRA Phases 1, 2, and 3. The combination of field observations, spatial mapping, cadastral data, and stakeholder insights a comprehensive understanding of the patterns, drivers, and implications of land use transformations in the study area.

Primary Data

Field Observations and Spatial Mapping

Systematic field observations were conducted between June and August 2022 across GRA Phases 1, 2, and 3 to identify properties that had undergone residential-to-commercial use conversion. Geographic coordinates of all identified commercial properties were collected using a Garmin eTrex 32x handheld GPS receiver, operating under the WGS 84 geographic coordinate system. The device provides a horizontal positional accuracy of approximately ± 3 meters under open-sky conditions, which was verified during fieldwork by ensuring satellite lock with a minimum of 8–12 satellites before recording each point.

For each property, attribute data were simultaneously recorded, including current land-use classification (e.g., retail, office, hospitality, educational), observable building modification indicators, and street-level context. Data were logged in structured field sheets and later digitized into a geodatabase.

Spatial data processing and mapping were performed in QGIS 3.28, where GPS points were projected to UTM Zone 32N for spatial analysis. The dataset was integrated with cadastral layers and high-resolution satellite imagery to validate property locations and confirm land-use status. Spatial analytical techniques, including point density analysis, buffer analysis (50m and 100m road proximity buffers), and nearest neighbour clustering, were applied to evaluate the distribution, corridor concentration, and hotspot formation of commercial conversions.

This methodological approach enabled the empirical identification of spatial clustering patterns and commercial corridors, providing statistically defensible evidence of property use transformation within the study area.



Secondary Data

Cadastral Maps, Zoning Regulations, and Historical Records

To complement primary data, secondary data sources were utilized to provide historical and regulatory context for property use conversions in Port Harcourt's GRAs. Cadastral maps were obtained to analyze the original property use designations and compare them with current property uses. This helped in assessing the extent of zoning alterations and compliance with urban planning regulations.

GIS Methods

Spatial analysis was conducted using ArcGIS 10.8. Field-collected coordinates were imported in WGS 84 (EPSG:4326) and projected to WGS 84 / UTM Zone 32N (EPSG:32632) to ensure accurate distance-based computation.

After validation against cadastral layers, a spatial dataset comprising 604 verified commercial property conversions was established for analysis. To evaluate their spatial distribution across GRA Phases 1–3, the following procedures were applied:

- i. **Nearest Neighbour Analysis (NNA):** Used to determine whether the spatial pattern of commercial properties was clustered, random, or dispersed. The Nearest Neighbour Ratio (R) and associated Z-score were calculated to test statistical significance.
- ii. **Road Proximity Buffer Analysis:** 50 m and 100 m buffers were generated around major corridors (Woji Road, Evo Road, King Perekule Street, and Tombia Extension) to quantify corridor-driven concentration.

These procedures enabled empirical assessment of clustering intensity and corridor-based commercial concentration within the study area.

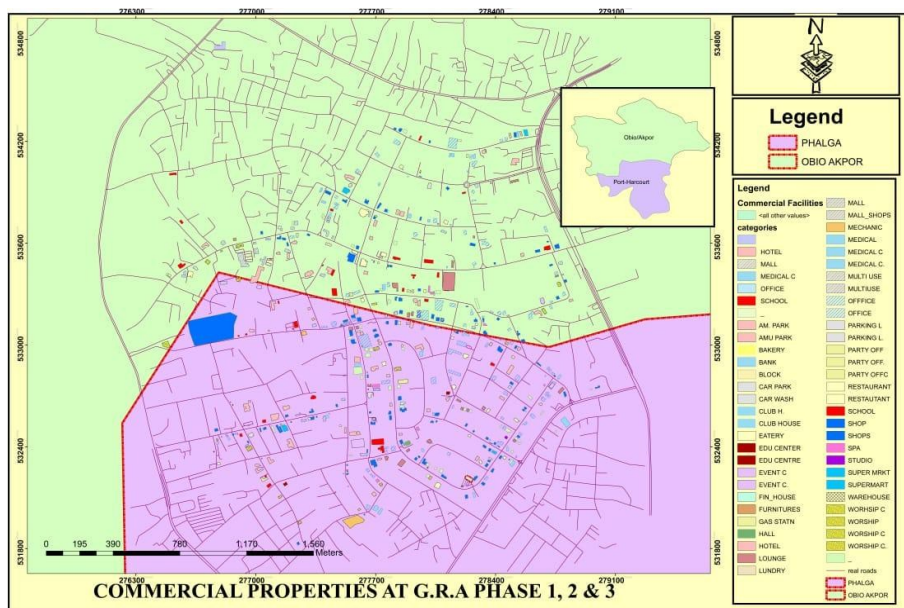
RESULTS AND DISCUSSION

Spatial Analysis of Property Use Conversions

Mapping Commercial Properties Across PHALGA and OBALGA

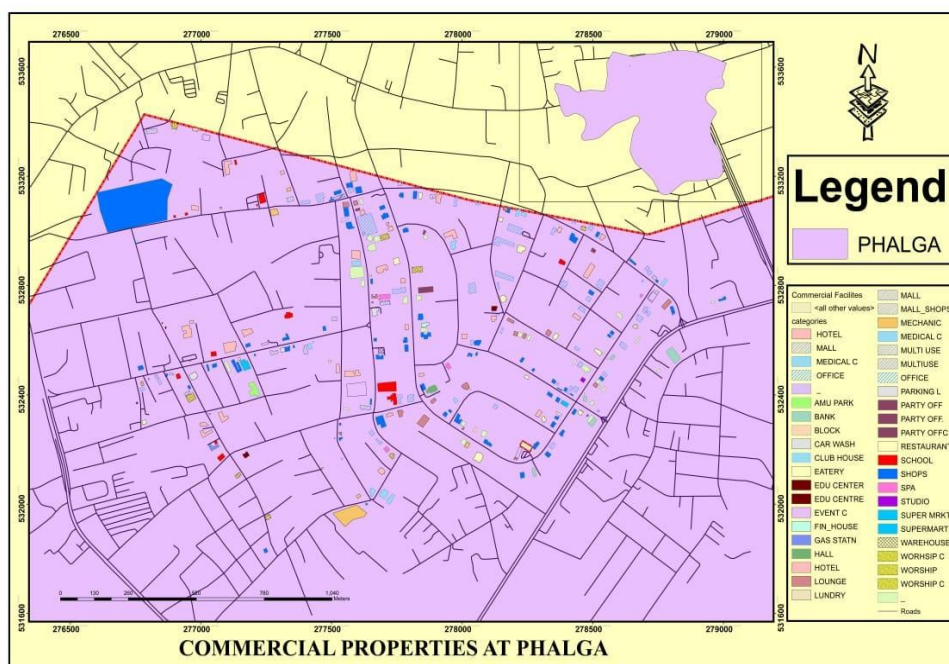
From field observations, all properties were spatially identified and mapped in GRA Phases 1, 2, and 3, spanning Port Harcourt Local Government Area (PHALGA) and Obio/Akpor Local Government Area (OBALGA). The spatial analysis using Figures 4.1, 4.2, and 4.3 highlights the distribution of commercial properties across both local government areas.

- Figure 4.1 presents an overview of commercial property distribution across PHALGA and OBALGA, showing the extent of business activity in the study area.

Figure 4.1: Map showing commercial properties in GRA Phases 1, 2 and 3

Source: Authors' Field Survey, 2022

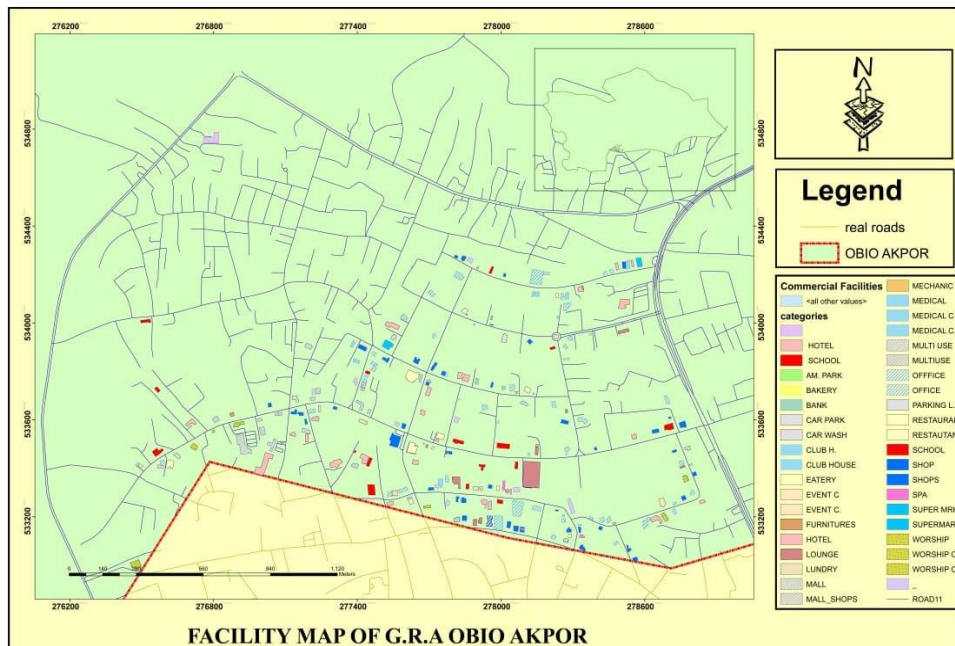
- Figure 4.2 focuses on PHALGA, where commercialization is most concentrated, with commercial properties highlighted.

Figure 4.2: Map showing commercial properties in PHALGA part of the GRA Phases 1, 2 and 3

Source: Authors' Field Survey, 2022

- Figure 4.3 illustrates commercial expansion in OBALGA, with commercial properties highlighted, showing the gradual transformation of residential areas into business zones.

Figure 4.3: Map showing commercial properties in OBALGA part of the GRA Phases 1, 2 and 3



Source: Authors' Field Survey, 2022

Street-Level Property Use Conversions

Analysis of Commercial Properties by Street

A detailed street-level analysis of commercial property distribution is provided in Table 4.1, which lists the total number of commercial properties recorded along various streets in GRA Phases 1, 2, and 3. The analysis of Table 4.1 shows that commercial properties are heavily clustered along major roads, particularly Woji Road, Evo Road, and King Perekule Street. The streets with lower commercial density remain largely residential, but gradual commercialization is evident in some areas.

Table 4.1: Streets in GRA Phase 1, 2 and 3 and Number of Commercial Properties

S/No	Location/Street Name	No. of Commercial Properties	%
1	Woji road	88	14.6
2	Abacha Road	66	10.9
3	Evo road	56	9.2
4	King Perekule	42	7
5	Tombia Extension	37	6.1



S/No	Location/Street Name	No. of Commercial Properties	%
6	Onne	23	3.8
7	Tombia Street	23	3.8
8	Omerelu Street	23	3.8
9	Tombia Road	19	3.1
10	Apara road	18	3
11	Elelenwo street	18	3
12	IBB way/Amaechi Drive	16	2.6
13	Orogbum crescent	14	2.3
14	Birabi street	14	2.3
15	Gen. Diriya street	11	1.8
16	Woke Road	10	1.7
17	Prof. Abowei	10	1.7
18	Emeyal street	9	1.2
19	Can link road	7	1.2
20	Royal crescent	7	1.2
21	Link road	7	1.2
22	Idiagbon	6	1
23	Alfa Close/Bimkol crescent	6	1
24	Bodo Street	6	1
25	Obanaobaan	6	1
26	Bishop Dimeari street	5	0.8
27	Evo Crescent	5	0.8
28	Lord Ugboma drive	4	0.7
29	Greg Obeifun close	4	0.7
30	Brookstone close	4	0.7
31	Hon. Temple Amadi Avenue	3	0.5
32	Chinua Worlu Drive	3	0.5
33	Dr. Sam Wobo Street	3	0.5
34	Casablanca road	3	0.5
35	Obagi street	3	0.5
36	Opobo Crescent	3	0.5
37	Amaji street	3	0.5
38	Orusa Road	2	0.3
39	Dick Wami	2	0.3
40	Louis drive	2	0.3
41	King Boms Close	2	0.3
42	Kings Avenue	2	0.3
43	Ndoni Street	2	0.3



S/No	Location/Street Name	No. of Commercial Properties	%
44	Oringwo road	1	0.2
45	Chief F. N. J. Woke Road	1	0.2
46	Olaka Street	1	0.2
47	Ohiamini street	1	0.2
48	St Michaels crescent	1	0.2
49	Aya Minima Lane	1	0.2
50	Royal Residence close	1	0.2
51	New Heaven close	0	0

Total = 604 | 100%

Source: *Researcher's field Observation, 2022*

Categories of Commercial Properties

Breakdown of Property Categories

The commercial properties in GRA Phases 1, 2, and 3 were categorized based on their primary function and business activity. Table 4.2 presents the full breakdown of commercial property types, along with their total number and percentage share of the 604 commercial properties identified in the study area.

The findings presented in Table 4.2 reveal a clearly stratified commercial structure within GRA Phases 1, 2, and 3. Retail uses; including malls, shops, and boutique outlets, constitute the largest category, accounting for 31.62% of all identified commercial properties. These establishments are heavily concentrated along major arterial corridors such as Woji Road, Evo Road, and Tombia Street, reflecting strong consumer-driven clustering along high-visibility routes. Offices represent the second-largest category at 19.70%, predominantly located along King Perekule Street, Tombia Road, Obagi Street, and Evo Road, signaling the growing prominence of corporate and professional services within the GRAs. The office category encompasses law firms, real estate agencies, financial consultancies, and emerging technology enterprises, underscoring the district's transformation into a business hub. Hospitality establishments, including hotels, guest houses, and serviced apartments, account for 11.09% of commercial properties, reinforcing Port Harcourt's role as a regional centre for business travel and accommodation services. Educational facilities—comprising private schools, vocational institutes, and training centres—constitute 6.62% of commercial conversions and are more spatially dispersed across both PHALGA and OBALGA, indicating a broader functional integration into the urban fabric. Eateries and restaurants, representing 5.64% of properties, are primarily situated near retail and office clusters, demonstrating complementary service-location behaviour within the evolving commercial ecosystem.

**Table 4.2: Categories of Commercial Property Uses Located in GRA phase 1, 2, and 3**

S/No	Categories of uses	Total	Percentage (%)
1	Amusement park	2	0.33
2	Bank/financial institutions	8	1.32
3	Block industry	1	0.17
4	Car park/parking lot	4	0.66
5	Car wash	10	1.66
6	Club house/lounge	31	5.13
7	Eatery/restaurant	34	5.64
8	Educational facilities/schools	40	6.62
9	Event place/hall	11	1.82
10	Gas station	1	0.17
11	Government parastatal	1	0.17
12	Hotels	67	11.09
13	Laundry	8	1.32
14	Mall/shops/studios/bakery	191	31.62
15	Mechanic workshop	10	1.66
16	Medical centre	23	3.81
17	Office	119	19.70
18	Party office	7	1.16
19	Spa	8	1.32
20	Supermarket	6	0.99
21	Warehouse	1	0.17
22	Worship centre	21	3.48
	Total commercial uses	604	100.01

Source: *Researcher's field observation, 2022.*

DISCUSSION AND FINDINGS

Land Use Mapping and Spatial Analysis

The findings from land use mapping and GIS spatial analysis reveal a significant shift in property use from residential to commercial functions in GRA Phases 1, 2, and 3 of Port Harcourt. The geospatial analysis techniques, including overlay analysis, buffer analysis, and spatial clustering, provided a comprehensive representation of commercialization trends and zoning violations. The study identified commercial hotspots, primarily located along major transportation corridors, confirming earlier studies on urban transformation in Nigerian cities (Owei et al., 2010; Ede, 2018).

These results align with urban economic theories, such as Alonso's Bid-Rent Theory (1964), which states that businesses outbid residential users for prime locations, leading to higher concentrations of commercial activities in accessible urban spaces. Similarly, Harvey's (1973)



Theory of Uneven Development explains the observed spatial expansion of commercial properties, driven by capital investment and economic speculation in high-value urban areas.

The spatial analysis demonstrates that commercial property expansion within the GRAs follows a clearly corridor-driven pattern, with businesses strategically locating along major arterial roads to maximize visibility, accessibility, and economic viability. This concentration along high-traffic routes reflects deliberate site selection behaviour consistent with urban economic theory. At the same time, the analysis reveals significant zoning irregularities, as numerous parcels originally designated for residential use have been converted into commercial premises with limited evidence of regulatory enforcement. The intensity of commercial clustering is most pronounced within PHALGA, where economic activities are densely concentrated and spatial competition for prime locations is strongest. In contrast, OBALGA exhibits a more gradual pattern of commercial expansion, characterized by emerging mixed-use transitions rather than fully consolidated business corridors. Together, these findings confirm that commercialization within the GRAs is neither random nor evenly distributed but structured by accessibility, regulatory weakness, and evolving market pressures.

Street-Level Analysis of Commercial Property Use Changes

The street-level analysis provides a granular understanding of commercial property distribution, revealing the patterns of urban transformation in Port Harcourt GRA Phases 1, 2, and 3. Unlike broader spatial analysis, which focuses on large-scale trends, street-level assessment identifies specific corridors where commercial activities are concentrated, offering insights into land use dynamics, business location preferences, and urban planning challenges.

Commercial property expansion at the street level is driven by accessibility, economic demand, and land value appreciation, confirming that businesses strategically position themselves along high-traffic routes to maximize customer visibility, economic viability, and ease of transportation. This corroborates with the findings of Wechie and Kakulu (2024), and this trend aligns with Christaller's (1933) Central Place Theory, which explains how commercial entities cluster in central and accessible locations to optimize their service reach and profitability.

The commercial mapping process, illustrated in Figures 4.1, 4.2, and 4.3, provides a visual representation of these trends.

Commercial Density Variations between PHALGA and OBALGA

The comparison between PHALGA and OBALGA reveals notable differences in commercial density and expansion rates:

Comparative Commercial Density between PHALGA and OBALGA.

Feature	PHALGA	OBALGA
Commercial Density	High	Moderate
Business Clustering	Very High along major roads (Woji Road, Evo Road, Tombia)	Increasing but less dense
Zoning Enforcement	Weak, with high levels of property conversion	Moderate, with more mixed-use developments
Expansion Rate	Rapid, due to demand for business spaces	Gradual, with emerging commercial hubs

Source: *Researcher's field observation, 2022.*



These differences suggest that PHALGA has reached an advanced stage of commercialization, while OBALGA is still in a transitional phase, presenting an opportunity for planned commercial expansion.

Analysis of Commercial Properties by Street

The data presented in Table 5.1 clearly identify the hierarchy of commercial intensity within the study area, revealing pronounced clustering along major transportation corridors. Streets such as Woji Road, Abacha Road, Evo Road, and King Perekule Street dominate the distribution, collectively accounting for a substantial proportion of all commercial properties. This concentration underscores the decisive role of accessibility, traffic flow, and locational visibility in shaping property conversion patterns within the GRAs. Rather than exhibiting dispersed growth, commercial activities are spatially structured around high-mobility routes, forming identifiable commercial corridors. The observed pattern reinforces the argument that accessibility-driven land value dynamics are actively restructuring formerly residential streets into economically competitive urban nodes. As demonstrated previously in Table 4.1, Woji Road and Evo Road represent the most commercialized streets.

From the street level analysis, commercial density is highest on major roads. Woji Road (14.6%) and Evo Road (9.2%) have the highest number of commercial properties, indicating that businesses strategically locate themselves along high-traffic routes. These roads accommodate a diverse range of businesses, including shopping centres, corporate offices, and hospitality establishments, nightclubs, making them the core business districts of the GRAs.

There is a progressive commercial expansion in the streets. While King Perekule Street (7.0%) and Tombia Extension (6.1%) have lower commercial densities compared to Woji and Evo Roads, they are experiencing gradual business growth. The presence of mixed-use developments suggests that these areas are transitioning from primarily residential to commercial zones. Onne Street (3.8%), although less commercialized, still shows signs of increasing business activities, particularly in retail and office-based enterprises.

Furthermore, less commercialized Streets Remain Primarily Residential. Streets further away from key commercial corridors remain largely residential, indicating that commercial expansion is selective and follows economic demand. This trend aligns with the theory of urban spatial diffusion (Burgess, 2015), where commercial activities gradually expand outward from central business districts into surrounding areas.

The findings presented in Table 5.1 are consistent with broader empirical research on urban commercialization and land-use restructuring. Yeh and Li (2001), in their GIS-based analysis of commercial clustering in Hong Kong, demonstrated that businesses exhibit a strong preference for locations along major transport corridors, where accessibility and traffic flow enhance economic performance. This spatial tendency mirrors the pattern observed in Port Harcourt's GRAs, where Woji Road and Evo Road function as dominant commercial axes. Similarly, Kombe's (2005) study of Dar es Salaam showed that commercial property conversions frequently follow transportation-led development patterns, underscoring the structuring role of road infrastructure in shaping business distribution. Taken together, these comparative insights indicate that the corridor-based commercial intensification observed in Port Harcourt is not anomalous but reflects a broader and recurrent dynamic in expanding urban economies, where prime arterial routes evolve into concentrated centres of economic activity.



Categories of Commercial Properties

The classification of commercial properties in GRA Phases 1, 2, and 3 reveals a diverse commercial landscape, with businesses spanning retail, corporate, hospitality, education, and food services. The dominance of certain commercial categories highlights the economic evolution of Port Harcourt, reinforcing its status as a major business hub.

The distribution of commercial property types, as shown in Table 5.2, reflects market demand, economic opportunities, and urban development trends, offering insights into business clustering, real estate investments, and infrastructure needs.

As shown in Table 4.2, retail uses; including malls, shops, boutiques, and other retail outlets, constitute the largest commercial category, accounting for 31.62% of all identified commercial properties within the GRAs. This dominance indicates a strongly consumer-driven commercial structure, with nearly one-third of all conversions linked to retail activity. The concentration of shopping malls and large retail complexes along major corridors such as Woji Road, Evo Road, and Tombia Street underscores the strategic alignment between retail viability and accessibility. These corridors attract a mix of small-scale enterprises and high-end commercial establishments, reinforcing the GRAs' emergence as a significant retail hub within Port Harcourt. The prevalence of supermarkets, fashion outlets, electronics stores, and bakeries further reflect diversified consumer demand and an expanding urban service economy.

These findings align with Kombe (2005), who studied commercial expansion in Dar es Salaam and found that retail businesses and shopping centres were the primary drivers of urban land use transformation. Similarly, Henderson (2010) highlights that retail clustering in high-traffic urban centres is a global trend, as businesses seek to maximize consumer footfall and accessibility.

The second-largest commercial category is corporate offices, accounting for 19.70% of properties. This reflects Port Harcourt's increasing demand for business and professional services, as more corporate firms, financial institutions, and administrative offices establish themselves in the GRAs. King Perekule Street, Evo Road, and Tombia Road host the highest number of office buildings, suggesting a strategic clustering of corporate activities. Real estate companies, legal firms, financial consultants, and multinational corporations dominate the office sector, indicating business confidence in the GRAs as a stable corporate environment. Modern office spaces with co-working hubs and serviced offices are emerging, showing a shift towards flexible business spaces and digital entrepreneurship.

The rise in office spaces aligns with Smith's Rent Gap Theory (1996), which argues that property owners convert residential spaces to commercial uses when rental income from businesses becomes significantly higher. A similar trend was observed in Lagos (Makinde, 2014), where corporate office expansion transformed former residential neighbourhoods into thriving business hubs.

Hotels and hospitality businesses make up 11.09% of all commercial properties, reflecting Port Harcourt's growing importance as a business and tourism destination. The expansion of luxury hotels, boutique accommodations, and serviced apartments highlights a rising demand from business travelers, expatriates, and event organisers. Major hotels are clustered along Woji Road, Evo Road, and King Perekule Street, suggesting a preference for central locations with good transport links. Boutique hotels and guesthouses are emerging alongside luxury



accommodations, catering to different market segments. The presence of event centres, nightclubs, and lounges suggests that the hospitality sector is evolving beyond accommodation to include entertainment and leisure services.

These findings support the urban hospitality growth model outlined by Telfer & Sharpley (2008), which explains that as cities expand economically, the hospitality industry grows to accommodate business tourism and corporate events. Similar hospitality trends have been observed in Abuja, Nairobi, and Accra, where business districts have led to increased hotel development and tourism investments (Makworo & Mireri, 2011).

Educational facilities, including private schools, vocational training centres, and higher learning institutions, account for 6.62% of commercial properties. The growing presence of educational institutions suggests a shift towards knowledge-based urban economies, where education and skills development become part of commercial land use. Educational institutions are more evenly distributed across PHALGA and OBALGA, rather than being concentrated along major commercial streets. Private schools, technology institutes, and business training centres are expanding, meeting the demand for specialized education and professional skills training. Some former residential properties have been converted into schools and learning centres, reflecting a trend towards adaptive reuse of properties.

Educational facilities, accounting for 6.62% of commercial properties (see Table 4.2), reflect the gradual integration of knowledge-based functions into the evolving commercial landscape of the GRAs. As urban economies expand, educational institutions increasingly operate as complementary land uses within commercial districts, supporting professional and service-sector growth. Comparable patterns have been observed in cities such as Cape Town and Kuala Lumpur, where educational hubs have emerged alongside corporate clusters, reinforcing knowledge-driven urban restructuring. In the GRAs, the spatial distribution of private schools and training institutes across both PHALGA and OBALGA suggests functional diversification rather than corridor-specific concentration.

The classification of commercial properties in GRA Phases 1, 2, and 3 highlights Port Harcourt's transformation into a diverse commercial hub, with retail, office spaces, and hospitality businesses driving urban economic growth.

CONCLUSION

This study provides an empirical spatial assessment of residential-to-commercial property conversions within GRA Phases 1, 2, and 3 of Port Harcourt. The analysis identified 604 commercial properties and demonstrated that conversions are strongly corridor-driven, with the highest concentrations occurring along Woji Road, Abacha Road, Evo Road, and King Perekule Street. The spatial pattern confirms accessibility-based commercial intensification and structured clustering rather than random distribution.

The categorization of commercial uses further reveals a stratified commercial landscape dominated by retail (31.62%), office functions (19.70%), and hospitality establishments (11.09%), signaling a transition from low-density residential zoning toward a mixed, service-oriented urban economy. Collectively, these findings confirm that the GRAs are undergoing



measurable spatial restructuring shaped by accessibility, market pressure, and regulatory weakness.

RECOMMENDATIONS

Based on the empirical findings of this study, the following policy actions are recommended:

Zoning Enforcement and Boundary Clarification

Establish clearly demarcated commercial and residential boundaries within the GRAs, supported by strict enforcement mechanisms. Planning authorities should review and update zoning classifications to reflect evolving land-use realities while preventing uncontrolled encroachment into remaining residential zones.

Cadastral Updates and GIS-Based Monitoring

Institutionalize the use of GIS for continuous monitoring of property use conversions. Regular land-use audits should be conducted using updated cadastral databases and spatial clustering analysis to detect emerging hotspots early and improve regulatory response capacity.

Corridor-Based Planning Strategy

Recognize major arterial roads (e.g., Woji Road, Evo Road, King Perekule Street) as formalized commercial corridors and develop targeted planning guidelines for these zones. This approach would manage density, signage, parking demand, and traffic flow while reducing spillover pressure into adjacent residential streets.

Infrastructure and Parking Upgrades

Upgrade supporting infrastructure; including road capacity, drainage systems, parking facilities, and pedestrian access, in high-intensity commercial corridors to accommodate increased economic activity without degrading urban liveability.

Managed Mixed-Use Development

Adopt a structured mixed-use framework that permits compatible commercial activities while protecting essential residential functions. This strategy should prevent displacement pressures and maintain socio-spatial balance within the GRAs.

Hospitality and Service Economy Regulation

Develop regulatory standards for hospitality expansion, including traffic management, security requirements, and infrastructure provision. Properly managed hospitality growth can be leveraged to strengthen tourism and investment while maintaining urban order.



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