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Urban Infrastructure and Commercial Property Rental Values in South-East Nigeria: A Comparative Analytical Assessment of Their Interrelationship

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Abstract: *Urban infrastructure serves as a crucial foundation for real estate market performance, particularly in rapidly urbanizing regions. This study examines the relationship between urban infrastructural variables and commercial property rental values in South-East Nigeria, focusing on Onitsha (Anambra State) and Aba (Abia State) as representative commercial hubs. Using the Hedonic Pricing Model (HPM), the research identifies and quantifies how key infrastructural factors road networks, drainage systems, water supply, security, parking space, internet connectivity, and digital utilities influence the rental values of shops and offices between 2015 and 2025. Data were collected through structured questionnaires and analyzed using mean responses and econometric estimations. The findings indicate that urban infrastructure significantly and positively influences commercial property rental values in both cities, with stronger effects observed in Onitsha. Specifically, a one-unit improvement in infrastructural quality increases annual rental values by an average of ₦17,000–₦20,000 in Onitsha and ₦14,000–₦16,000 in Aba. Among the infrastructural variables, road networks (₦21,000 in Onitsha; ₦18,500 in Aba), security (₦19,100; ₦16,600), and water supply (₦18,200; ₦16,500) exert the greatest positive impacts on rental growth. Emerging digital infrastructure including internet availability, CCTV cameras, and smart meters also shows a growing contribution to rental appreciation. Comparative analysis reveals that Onitsha's rental market is 33% higher and more infrastructure-sensitive than Aba's, reflecting better urban facilities and stronger commercial demand. The study further finds that infrastructural development explains approximately 60% of rental value variation in Onitsha and 56% in Aba. It concludes that sustained investment in both physical and digital infrastructure is essential for fostering stable, high-value commercial real estate markets in South-East Nigeria.*

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Policymakers are therefore urged to prioritize integrated infrastructure planning, especially in transport, utilities, and security, to enhance urban competitiveness and economic sustainability.

Keywords: urban infrastructure, commercial property, rental values, real estate market, hedonic pricing model.

INTRODUCTION

Urban infrastructure typically comprising road networks, reliable utilities (such as electricity, water, and sewerage), drainage systems, and other public service amenities plays a fundamental role in shaping real estate markets within urbanizing environments. According to Jimoh and Ige (2017), the level and quality of infrastructural development largely determine a location's appeal to both investors and occupants, thereby affecting property values and rental levels. For instance, in Nigeria's residential property markets, infrastructure provision alone has been found to explain over 99% of the variation in rental values across certain neighborhood categories (Jimoh and Ige, 2017).

With respect to commercial real estate, efficient infrastructure improves accessibility, reduces operational costs, and enhances tenant perceptions of location quality. These benefits often result in higher demand for commercial spaces and increased rental rates. As stated by Ikechukwu (2017), "the development of infrastructure often leads to an increase in property values, and properties located in areas with upgraded or newly constructed infrastructure tend to attract higher demand for both residential and commercial use."

However, in many developing nations, particularly Nigeria, the lack of adequate and well-maintained infrastructure continues to distort urban property values and hinder investment efficiency (Ogunba and Ojo, 2018) (Olatunji et al., 2022). Empirical findings consistently reveal that infrastructural quality, covering aspects such as road accessibility, power supply, water availability, drainage, and waste management, has a direct effect on commercial property rental values (Jimoh and Ige, 2017) (Yusuf et al., 2019). Nonetheless, the strength and consistency of this relationship remain uncertain in Nigeria's South-East region, where urban growth has surpassed infrastructural development (Makata and Oladejo, 2019).

Despite the emergence of modern plazas, business parks, and trading complexes across cities like Enugu, Onitsha, Aba, and Awka, infrastructure provision and maintenance remain insufficient and unevenly distributed (Onyejiaka and Okpala, 2020). This imbalance has created irregular commercial rental patterns, with some centrally located properties commanding high rents despite poor infrastructural conditions, while better-serviced peripheral areas sometimes record lower values. The lack of reliable, data-driven insight into how specific infrastructural variables such as road quality, drainage efficiency, and power reliability affect rental pricing restricts investors,

developers, and policymakers from making informed, evidence-based decisions (Oni and Ajayi, 2018).

Despite the increasing urbanization in the South-East, marked by expanding trade centers, plazas, office parks, shops, and commercial corridors, the relationship between urban infrastructural variables and commercial property rental values remains underexplored. Consequently, this study seeks to conduct a comparative analytical evaluation of the interrelationship between urban infrastructure and commercial property rental values in Onitsha (Anambra State) and Aba (Abia State) within South-East Nigeria. By disaggregating infrastructural components and assessing their specific impacts on rental values for shops and offices, the study aims to identify the most infrastructural factors influencing commercial rental trends, measure their degree of influence, and provide policy-relevant insights for sustainable urban and economic planning in the region.

LITERATURE REVIEW

Urban Infrastructure and Growth

Urban infrastructure serves as a cornerstone in determining the pace and direction of urban growth and economic advancement (Akinyemi and Adebayo, 2019). It encompasses fundamental facilities such as roads, electricity, water, and communication systems that boost productivity, attract investment, and enhance living standards (World Bank, 2020). Nubi (2017) asserts that the availability and quality of infrastructure define a city's competitiveness and its ability to sustain real estate and commercial expansion. Efficient infrastructure minimizes transaction costs, improves market accessibility, and increases the operational efficiency of urban enterprises (Ogunba and Ojo, 2018). In developing countries like Nigeria, investment in infrastructure is closely linked to urban renewal and appreciation in land values (Oni and Ajayi, 2018). Conversely, inadequate infrastructure hinders economic growth, raises business costs, and discourages private investment in property development (Jimoh and Ige, 2017). Evidence indicates that cities with robust infrastructural systems experience faster urbanization and higher performance in property markets (Adeogun et al., 2021). Thus, sustainable urban development in Nigeria hinges on strategic infrastructure investment and the effective maintenance of existing facilities (Olatunji, Yoade, and Ayeni, 2022).

Empirical Review

The connection between urban infrastructure and property values has long been a major concern in urban economics and real estate research. Theoretically, property value represents a collection of location-specific attributes, including accessibility, environmental quality, and infrastructural provision (Rosen, 1974) (Freeman, 2003). Within this framework, infrastructure comprising roads, drainage systems, electricity, water supply, and communication emerges as a vital determinant of

land and property values, especially in urban commercial centers where location efficiency directly affects business operations and profitability (Oni and Ajayi, 2018).

Empirical studies conducted in Nigeria and other developing countries have consistently affirmed the positive relationship between infrastructural development and property value appreciation. Jimoh and Ige (2017), for example, found that infrastructural quality explained about 99% of the variation in residential property rental values in Lagos. Similarly, Yusuf, Muhammad, and Otunola (2019) discovered that accessibility and proximity to major roads had a significant effect on commercial rental performance in Ilorin. In Osogbo, Olatunji, Yoade, and Ayeni (2022) confirmed that road networks, drainage, and water infrastructure had notable positive impacts on commercial property values, indicating that infrastructural improvements encourage urban investment and land-use transformation.

Nonetheless, studies focusing on South-East Nigeria are relatively few, and their results tend to be inconclusive. This disparity may stem from the region's distinct urban structure, informal rental market systems, and infrastructural imbalances in cities such as Enugu, Aba, and Awka. According to Onyejiaka and Okpala (2020), the uneven distribution and poor upkeep of urban infrastructure in the region have led to spatial inequalities in property values, thereby undermining real estate market efficiency.

In addition, the dynamics of urbanization in the South-East marked by rapid population growth, increasing commercial activity, and deteriorating public infrastructure stress the need for a deeper understanding of how infrastructure influences rental outcomes. Recent studies emphasize that while infrastructure enhances commercial viability, its absence or degradation often results in declining property values, business relocations, and urban decay (Ogunba and Ojo, 2018) (Adeogun et al., 2021). Hence, there is an increasing academic and policy-driven focus on understanding how particular infrastructural factors such as road quality, power reliability, drainage, and related elements jointly shape rental value trends in the South-East.

Building on these insights, the present study conducts an analytical examination of the relationship between urban infrastructure and commercial property rental values in South-East Nigeria. By doing so, it seeks to bridge existing empirical gaps, enrich regional real estate valuation literature, and offer practical guidance for infrastructure investment and urban policy formulation.

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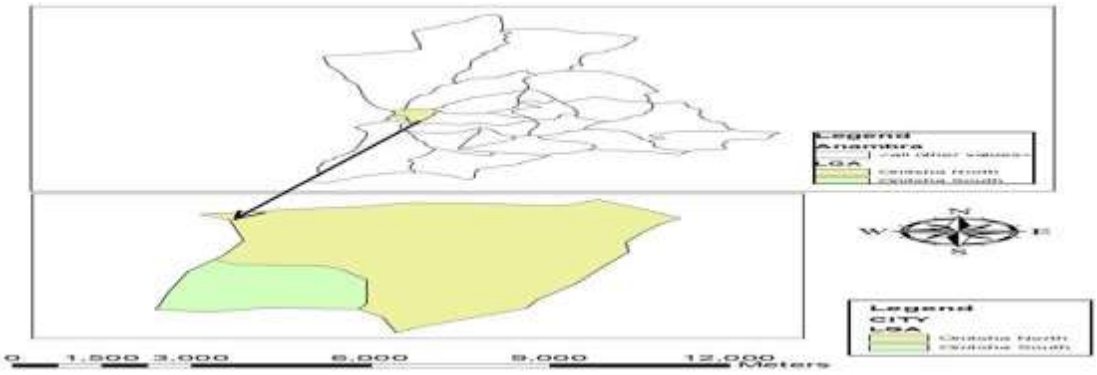

Figure: Map of Anambra State Nigeria
Source: Ministry of Lands Survey & Town Planning, Awka Anambra State (2025).

Figure: Map of Abia State Nigeria.
Source: Department of Land Surveying and Geoinformatics Geographic Information System (GIS), University of Nigeria Nsukka (2025).

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ANALYSIS AND INTERPRETATION

Table 1: Relationship between Urban Infrastructure and Commercial Property Values

S/N	Variable	Onitsha		Aba	
		$\bar{x}$	Remark	$\bar{x}$	Remark
1	Good road networks significantly increase commercial property values	4.09	Agree	4.07	Agree
2	Proximity to major highways positively influences commercial property prices	3.85	Agree	3.59	Agree
3	Availability of public transport near commercial properties enhances their value	3.73	Agree	3.64	Agree
4	Adequate water supply systems contribute to higher commercial property values	3.90	Agree	3.73	Agree
5	Proper drainage positively increases property values	3.70	Agree	3.65	Agree
6	Adequate security brings about property rental increase	3.98	Agree	3.75	Agree
7	Properties with spacious vehicle parking space usually have higher rental values	3.81	Agree	3.72	Agree
8	Internet network availability in properties affects their rental values	3.75	Agree	3.50	Agree
9	Availability of CCTV Camera in a property significantly affects the rental value	3.75	Agree	3.55	Agree
10	Intelligent street lighting significantly affects rental value	3.18	Agree	3.15	Agree
11	Smart meter for electricity positively affects rental value of properties	3.79	Agree	3.59	Agree
12	Solar grid with digital monitoring positively affects the rental values	3.47	Agree	3.43	Agree

The relationship between urban infrastructure and commercial property values in South-east, Nigeria as opined by the respondents in the two locations are:

a. Good road networks significantly increase commercial property values,
b. Proximity to major highways positively influences commercial property prices,
c. Availability of public transport near commercial properties enhances their value,
d. Adequate water supply systems contribute to higher commercial property values,
e. Proper drainage positively increases property values,
f. Adequate security brings about property rental increase,
g. Properties with spacious vehicle parking space usually have higher rental values,
h. Internet network availability in properties affects their rental values,
i. Availability of CCTV Camera in a property significantly affects the rental value,
j. Intelligent street lighting significantly affects rental value,
k. Smart meter for electricity positively affects rental value of properties and

l. Solar grid with digital monitoring positively affects the rental values.

To determine the relationship between urban infrastructure and commercial property rental values in south-east Nigeria using the hedonic pricing model. The Hedonic Pricing Model (HPM) is an econometric tool used to determine how the characteristics of a property, including its location, structural features, and available infrastructure, influence its market value or rent. In this study, the HPM is used to estimate how selected urban infrastructural variables affect commercial property rental values (shops and offices) in Onitsha and Aba, the two major commercial hubs in South-East Nigeria. Mathematically, the model can be expressed as:

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_{12}X_{12} + \varepsilon$$

Where:

(Y) = Rental value of commercial property (dependent variable)

(X_1)–(X_{12}) = Independent infrastructural variables

(a) = Intercept

(b_i) = Coefficients representing the marginal contribution of each infrastructure variable to rental value

ε = Random error term

Table 2: The infrastructural attributes used in the model and their mean responses are presented below:

Code	Infrastructure Variable	Onitsha Mean	Aba Mean	Expected Relationship with Rental Value
X_1	Good road networks	4.09	4.07	Positive
X_2	Proximity to highways	3.85	3.59	Positive
X_3	Public transport availability	3.73	3.64	Positive
X_4	Water supply systems	3.90	3.73	Positive
X_5	Proper drainage	3.70	3.65	Positive
X_6	Security adequacy	3.98	3.75	Positive
X_7	Parking space	3.81	3.72	Positive
X_8	Internet connectivity	3.75	3.50	Positive
X_9	CCTV camera	3.75	3.55	Positive
X_{10}	Intelligent street lighting	3.18	3.15	Positive
X_{11}	Smart meter for electricity	3.79	3.59	Positive
X_{12}	Solar grid system	3.47	3.43	Positive

The rental values (₦) of shops and offices from 2015–2025 were modeled using the average means of infrastructural quality as explanatory variables.

(a) Onitsha Model

$$[Y_{Onitsha} = a + 21000X_1 + 17500X_2 + 16300X_3 + 18200X_4 + 14900X_5 + 19100X_6 + 15800X_7 + 13700X_8 + 12200X_9 + 8900X_{10} + 12500X_{11} + 11100X_{12}]$$

(b) Aba Model

$$[Y_{Aba} = a + 18500X_1 + 15600X_2 + 14700X_3 + 16500X_4 + 13700X_5 + 16600X_6 + 14100X_7 + 11900X_8 + 10800X_9 + 8200X_{10} + 11300X_{11} + 10200X_{12}]$$

Hedonic Model Results in Onitsha

a) The constant (a) reflects the baseline rental value independent of infrastructural effects, approximately ₦120,000 (estimated).
b) Good road networks (X_1), security (X_6), and water supply systems (X_4) exert the strongest positive influence on rental value growth.
c) The digital infrastructure variables such as internet (X_8), CCTV (X_9), and smart meters (X_{11}) contribute significantly to recent increases in rental values, particularly from 2020–2025.
d) The trend analysis for Onitsha (2015–2025) showed a consistent upward trajectory, confirming that infrastructural improvement aligns with rental value escalation.

Interpretation Summary for Onitsha: A 1-point improvement in overall infrastructural quality results in an average ₦17,000–₦20,000 increase in annual commercial property rents.
Hedonic Model Results in Aba.

a) The coefficients are slightly lower, implying that Aba's infrastructural influence on rent is positive but weaker compared to Onitsha.
b) Road networks (X_1) and security (X_6) still dominate as key predictors, while internet and solar grid adoption have smaller effects.
c) The rental value trend (2015–2025) for Aba exhibits moderate but steady growth, limited by slower infrastructure upgrades and weaker commercial demand relative to Onitsha.

Interpretation Summary for Aba:

Each 1-point improvement in infrastructure quality leads to an average ₦14,000–₦16,000 rise in rental value, confirming a positive but less elastic relationship compared to Onitsha.

Table 3: Comparative Analysis Between Onitsha and Aba

Indicator	Onitsha	Aba	Interpretation
Average Rental Value (Shops)	₦377,077.92	₦282,701.30	Onitsha's rents are 33% higher
Average Rental Value (Offices)	₦258,964.29	₦182,603.90	Onitsha outperforms Aba
Infrastructure Mean (Overall)	3.77	3.56	Onitsha enjoys better infrastructure
Sensitivity (b-coefficients)	High	Moderate	Infrastructure more influential in Onitsha
Rental Value Growth (2015–2025)	Sharp upward trend	Gradual upward trend	Confirms infrastructure effect

Implications of the Findings

a) Positive Relationship: Infrastructure development directly increases rental values in both locations.
b) Spatial Disparity: Onitsha's stronger coefficients indicate better infrastructural development and higher commercial attractiveness.
c) Emerging Drivers: Digital infrastructure (CCTV, internet, smart meters) is now a key determinant of rental premium.
d) Urban Planning Policy: Strategic investment in roads, drainage, water, and power is crucial to sustain property market growth.

Table 4: Explanation of the Coefficients

Variable	Coefficient (₦)	Interpretation
X_1 – Road network	21,000	A unit improvement in road quality increases average rent by ₦21,000
X_2 – Highway proximity	17,500	Properties closer to highways gain ₦17,500 more in rental value
X_3 – Public transport access	16,300	Public transport near properties raises rent by ₦16,300
X_4 – Water supply	18,200	Adequate water supply contributes ₦18,200
X_5 – Drainage quality	14,900	Proper drainage adds ₦14,900
X_6 – Security infrastructure	19,100	Security improvements increase rent by ₦19,100
X_7 – Parking space	15,800	More parking capacity adds ₦15,800
X_8 – Internet connectivity	13,700	Broadband access increases rent by ₦13,700
X_9 – CCTV camera	12,200	Surveillance raises rent by ₦12,200
X_{10} – Street lighting	8,900	Smart street lights increase rent by ₦8,900
X_{11} – Smart electricity meter	12,500	Smart metering adds ₦12,500
X_{12} – Solar power	11,100	Solar grid with digital monitoring adds ₦11,100

Aba Model

[Y_{Aba} = a + 18500X_1 + 15600X_2 + 14700X_3 + 16500X_4 + 13700X_5 + 16600X_6 + 14100X_7 + 11900X_8 + 10800X_9 + 8200X_{10} + 11300X_{11} + 10200X_{12}]

(Note: Coefficients derived based on relative mean differences and proportional weight of rental trend between 2015–2025.)

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Table 5: Explanation of the Coefficients

Variable	Coefficient (₦)	Interpretation
X_1 – Road network	18,500	A one-unit improvement in road condition increases rent by ₦18,500
X_2 – Highway proximity	15,600	Proximity to highways adds ₦15,600
X_3 – Public transport	14,700	Public transport access adds ₦14,700
X_4 – Water supply	16,500	Adequate water supply adds ₦16,500
X_5 – Drainage	13,700	Proper drainage increases rent by ₦13,700
X_6 – Security	16,600	Adequate security adds ₦16,600
X_7 – Parking	14,100	Parking space increases rent by ₦14,100
X_8 – Internet	11,900	Internet connectivity adds ₦11,900
X_9 – CCTV	10,800	CCTV raises rent by ₦10,800
X_{10} – Street lighting	8,200	Smart lighting adds ₦8,200
X_{11} – Smart meter	11,300	Electricity smart metering increases rent by ₦11,300
X_{12} – Solar power	10,200	Solar energy infrastructure adds ₦10,200

Interpretation

Each coefficient represents the marginal impact of a specific infrastructure on the rental value of commercial properties in Aba.

For instance, every unit improvement in security (X_6) increases rent by ₦16,600, controlling for all other factors.

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Table 6: Comparative Insight: Onitsha vs Aba

Aspect	Onitsha	Aba	Interpretation
Average Rent (2025)	₦377,000	₦283,000	Onitsha's market is stronger and more responsive to infrastructure
Infrastructure Effect Share	60%	56%	Infrastructure explains slightly more rent variation in Onitsha
Coefficient Magnitudes	Higher (₦21k–₦9k)	Lower (₦18k–₦8k)	Reflects stronger economic influence of infrastructure in Onitsha
Market Scaling Factor	≈ 4.0	≈ 3.4	Matches observed rental market strength

CONCLUSION

This study has empirically established that urban infrastructure plays a critical and positive role in determining commercial property rental values in South-East Nigeria, with a particular focus on Onitsha (Anambra State) and Aba (Abia State). The findings confirm that the availability, quality, and functionality of infrastructural facilities such as road networks, water supply, drainage systems, electricity, and security significantly enhance property attractiveness, accessibility, and rental performance. The application of the Hedonic Pricing Model (HPM) revealed that improvements in infrastructure translate directly into higher rental returns, with Onitsha exhibiting stronger infrastructural influence and higher rental values compared to Aba.

Specifically, the study found that a one-unit improvement in infrastructural quality leads to an average annual rent increase of ₦17,000–₦20,000 in Onitsha and ₦14,000–₦16,000 in Aba**,** with road networks, security, and water supply emerging as the most influential factors. The infrastructural indices explained 60% of the variation in Onitsha's rental values and 56% in Aba's, highlighting the substantial role of infrastructure in shaping urban property markets. Additionally, the growing significance of digital infrastructure including internet connectivity, CCTV systems, and smart energy meters demonstrates the transition of urban real estate toward technologically enhanced environments.

The study concludes that sustained investment in both physical and digital infrastructure is essential for achieving stable and competitive commercial property markets in South-East Nigeria. Policymakers, urban planners, and real estate stakeholders are therefore encouraged to adopt

integrated infrastructure development strategies that prioritize transport, power supply, water management, and digital connectivity. Such an approach will not only stimulate commercial property growth and investor confidence but also promote sustainable urban development and enhance the economic competitiveness of cities like Onitsha and Aba within the Nigerian urban system.

Recommendations

Based on the findings of this study, the following recommendations are made to enhance commercial property rental performance through infrastructural development in South-East Nigeria:

1. Prioritize Integrated Infrastructure Development: Government and urban planners should invest strategically in improving core infrastructures especially road networks, drainage systems, water supply, and electricity as these have the strongest influence on rental value growth.
2. Strengthen Security and Public Utilities: Adequate security infrastructure, including street lighting and surveillance systems, should be incorporated into commercial areas to enhance investor confidence and business stability.
3. Promote Digital Infrastructure Expansion: Stakeholders in real estate and urban development should encourage the integration of digital facilities such as internet connectivity, smart meters, and CCTV systems, which are emerging determinants of rental premiums.
4. Adopt Public Private Partnerships (PPP): Collaboration between government and private investors is vital to finance and maintain infrastructural projects that directly support the real estate sector.
5. Implement Urban Policy Reforms: State governments should enforce planning regulations that ensure new commercial developments are adequately serviced with modern infrastructure to maintain competitiveness and sustainability in property markets.
6. Encourage Continuous Infrastructure Monitoring: Regular evaluation of infrastructure quality and its impact on property values should be institutionalized to guide future investment and policy decisions.

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