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Metropolitan Infrastructure and Property Values: An African Experience

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ABSTRACT: This paper evaluated impact of infrastructure in residential property on its property values in Ibadan, Nigeria. A total number of 450 questionnaires were administered out of which 423 questionnaires were retrieved. Both descriptive and inferential statistics were used to analyze the data collected for the study). The study revealed that burglary proof was seen as the strongest index of satisfaction in the study area, this was followed by security guard. Kitchen and fenced round ranked third and fourth respectively, while bathroom/toilet and access road ranked fifth and sixth respectively. Water supply ranked seventh, while drainage channel ranked lowest in the study area. The paper concluded that property developers that want to invest in residential buildings development should endeavor to provide infrastructure that will attractive rental values on their residential property in Ibadan in particular and towns and cities in developing nations.

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Infrastructure network is the very socio-economic climate created by the institutions (public or private) that serve as conduits of trade and investment. The roles of infrastructure in the context of integration are transformative, helping to change resources into outputs or to enhance trade by removing barriers. Therefore, an improvement in a country's infrastructure is one of the key factors affecting the long-term growth of such a country (United Nations, 2002). The linkages between infrastructure and economic growth are varied and complex. Infrastructure does not only affect production and consumption directly, it also creates many direct and indirect externalities. It involves large flows of international trade, and quality of life (Nubi, 2000; Kumar, 2005; Olatunji *et al*, 2021). The concentration of industries in urban centers has promoted growth within cities. The industrial development has also contributed to diversified industrial structure which results to expansion in cities (Ajibola *et al*., 2013). The existence of industries in any urban center will create employment opportunities thus making people to migrate from rural to such urban settings for employment opportunities. Urban areas are able to induce economic activities because they enjoy an advantage in the supply factors of production especially labor. With this, the market becomes broader as the supply of real property resources, more sub-division of function occurs and economics of scale emerges in the provision of basic public utilities and services (Egbinola and Amanambu, 2015). With the increase in supply of real property, more demand will be made on residential properties and the higher the demand for accommodation, the higher the property value. Oduwaye (2009) noted that the increasing demand for residential property in our urban centers would continue to attract the real estate investors because of continuing property rent increases. This is supported by land economy theory which suggests that the balance of demand and supply is at equilibrium if for every new household exercising effective demand, there is an available house either for letting or purchase at a price that permits demand to stabilize supply. It should therefore be expected that when the demand for housing increases, the price or rent for such houses goes up and ultimately this encourages

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investors to undertake new developments. In line with this, cities develop as a result of the economic functions which necessitate the gathering of people and activities in any given area (Oni *et al*., 2007). The lifestyle in the urban area changes from an agrarian society to modern industrial economy. This is due to development in transport facilities, expansion of interregional commerce and the increased significance of service activities. Infrastructure like good road network, energy, water, hospitals, and educational facilities are drivers of economic growth. The quality of infrastructure available within any city has become increasingly important in attracting new investments. There is an ineffective administration structure to cater for the maintenance of our infrastructures at the urban centers, however, such problems could have been easily solved if other stake holders like private individuals, community-based organizations (CBO) and non-governmental organizations (NGO), apart from the government participate in the provision and management of urban infrastructure. It has thus become apparent that the provision and management of urban infrastructure cannot be left solely to government hence private sector participation is important. Similarly, the Longman online dictionary (2014) identify four categories of attributes namely; structural, physical, neighbourhood and environmental, for measuring residential property values, using hedonic equation in Hong Kong. Similarly, Rowland (2010) studied the effect of balconies on the residential property values in Hong Kong and found a positive effect on the value of a property irrespective of the quality of the view. Agbola and Kassim (2007) argues that major considerations for property value hinge on the property's ability to produce income, be in demand and have a good location relative to its use. He identifies other determinants of value to include scarcity, prospect of income growth, state of the economy, cost in use, government and political factors, physical attributes and taxation (Asikhia and Uyoyoghene, 2011; Akinola, 2007; Oni, 2007; Oduwaye, 2009). From the above, it can be said that little or no focus has been given to the impacts of infrastructure on property values especially in a metropolitan city, like Ibadan. It is against this background that this study examined effects of infrastructure on property value in Ibadan municipality, Nigeria.

METHODS AND MATERIALS

Study Area: Ibadan North Local Government, in Oyo State, Nigeria that is used in this study is a typical example of local government areas in Nigeria to which this nature of research can be replicated. Ibadan North LGA was created on 27th September, 1991, and exists between longitude 30 531 and 30 561 East of Greenwich Meridian and latitude 70 231 and 70 291 North of Equator with a total land area of about 145.58km2. Ibadan North LGA is bounded in the north by Akinyele LGA, in the south by Ibadan South-West LG, Ibadan South-East LGA and Oluyole Ona-Ara LGA and in the west by Ibadan North-West LGA, Ido LGA, Lagelu LGA and Egbeda LGA. The population of the LGA based on the latest 2006 national census is 306,795, with an annual growth rate of about 3.2%.

Methodology: Both primary and secondary data were utilized for this study. Two neighborhoods were selected every three residential densities in the local government: high-density, medium-density, and one low-density were randomly selected for the survey. The neighborhoods selected from the high density medium-density area were Oke-Are and Beere and Mokola and Orogun; whereas Agodi GRA and Ashi/Kongi were the ward selected from the high-density area. From each selected neighborhood, 75 households were randomly selected without replacement. Thus, 450 households in the study area were covered by the study.

However, 423 of the questionnaires were successfully retrieved which represent 94.0%. Data obtained were analyzed using percentages and the Relative Satisfaction Index

(RII). The total weight value (TWV) for each variable was obtained through the summation of the product of the number of responses for each rating of the variable and the respective weight value (Olojede *et a*l, 2017; Olojede *et al*, 2019. This is mathematically expressed as follows:

$$TWN = \sum_{I=1}^{5} N_i \, x \, W_i \qquad 1$$

$$RSI = \frac{TWN}{N} \qquad 2$$

RESULTS AND DISCUSSION

Respondents' Socioeconomic Characteristics: Table 1 shows that 29.3% of the respondents are in the age bracket of 41 – 50 years, while 24.3% of are within the age bracket of 31 – 40 years, 4.9% of the respondents were less than 20 years in the study area. Therefore, it can be deduced from the Table that majority of the respondents are still in their active age and whose ability to earn income can influence property values in real estate market in the study area. Finding reveals that 40.9% possess B. Sc degree, 27.0 obtain senior school certificate while the 9.8% of the respondents have no formal education in the study area. It could be deduced from this table that all the respondents possess academic qualifications, which will enhance their employability and hence improve their level of

income. Finding indicates that 26.1% of the respondents are unemployed, while 54.1% are self employed, and 4.7% were students. It could be deduced from Table 1 that a large proportion of the respondents have good source(s) of income which will enhance their ability to pay rent. Findings on respondents income establish that 43.0% earn more than 100,000 on a monthly basis, 27.8% earn between 80,001 and 100,00 while just 6.2% of the respondents earn less than 20,000 in a month.

Table 1. Respondents' Socioeconomic Characteristics

Variables	Frequency %	Percentage %
Age		
Less than 20years	21	4.9
20-30 years	42	9.9
31-40 years	103	24.3
41-50 years	123	29.3
51-60 years	76	17.9
60 years and above	58	13.7
Educational Level		
Primary school level	95	23.3
Secondary school level	114	27.0
Tertiary school level	173	40.9
Informal education	41	9.8
Employment Status		
Employed	229	54.1
Unemployed	113	26.7
Retired	62	14.7
Student	19	4.5
Monthly Income		
Less than 20,000	26	6.2
20,001 – 40,000	31	7.3
40,001-60,000	53	12.6
60,001-80,000	51	12.1
80,001-100,000	80	18.9
Above 100,000	182	43.0
Total	423	100.0

Source: Field Survey, 2018

Background information of the respondent: Table 2 contains the analysis of the ownership status of respondents in Ibadan North Local Government Area of Oyo State, Nigeria. The table shows that 74.5% are tenants while 25.5% are landlords. It is evident from the table that majority of the respondents are tenants whose opinion about rental information on the type of residential property they occupy could be relied upon. The analysis of the period of occupancy by the respondents is as shown in Table 1. The Table reveals that 26.7% of respondents have their occupancy period ranging from 1 – 5 years, 38.1% have being in the estate for between 6 and 10 years while 20.0% have been living there for a period of 5 – 6 years while 35.2% have lived there a period of more than 10 years. This implies that a considerable number of the respondents have been living in the study area long enough to give accurate responses as to the events that happened over the timeframe being considered. In Table 2, the analysis show that a larger proportion of respondents (55.8%) occupy blocks of flats, 25.1% occupy bungalows, 13.0% are living in tenement buildings while 6.1% of the respondents lives in a duplex. It could be deduced that majority of the respondents resides in block of flat and tenement buildings, majority of the respondents are tenants whose opinion about rental issues within the estate can be relied upon (Table 2).

Table 2. Background information of the respondents

Variables	Frequency %	Percentage (%)
Ownership status		
Landlord	108	25.5
Tenant	315	74.5
Length of stay		
1-5	113	26.7
6-10	161	38.1
10 and above	149	35.2
Type of property		
Tenement	55	13.0
Block of flat	236	55.8
Bungalow	106	25.1
Duplex	26	6.1
Total	423	100.0

Source: Field Survey, 2018

Infrastructural facilities available in the residential property in Ibadan North: The infrastructural facilities available in the residential property include electricity, water supply, access road, burglary proof, refuse disposal facility, toilet kitchen, drainage channel, and wall-fence and security services. The levels of provision of these facilities vary from building to building and from one zone to the other. Findings establish that 95.3% of the residential properties in the study area are connected with electricity. Majority of the sampled tenants in these area complained of epileptic supply of the electricity. On the issue of water supply is not based on the public water supply or connection to the public water supply because this is not functioning in the study area but on the provision of functional water supply either through hand-dug well or boreholes. In this respect, 81.8% of the residential property are provided with water from either hand-dug well or borehole. It is necessary to note that none of the zones has less than 72% of its residential property provided with water. The location of the hand-dug well within the house compound influences the level of safety of such water; particularly in the core area where most of the hand-dug well are located within the septic field. Every residential property is required to be provided with unhindered access road with a view to ensure safe movement of goods and services. Overall, 76.5% of the residential properties are accessible by motorable road. However, the residential property in the core zone is mostly affected by inaccessibility, where only 48.9% were only accessible. The installation of burglary proof in residential property serves as means

of ensuring security of property in such building. Finding reveals that 80.6% of the residential buildings in the study area are installed with burglary proof in their windows respectively. Furthermore, waste disposal facility in residential property in the study is generally poor and 57.2% of the residential property enjoyed refuses disposal services. This is connected with the special attention given to the core area of Ibadan by the Oyo State Waste Management Board because of the intensive commercial activities in the zone. Bathroom/toilet facility is one of the basic facilities in any functional residential property Overall, 64.3% of the sampled residential properties in the study area are provided with toilet facility. Finding also establishes that 85.1% of the residential properties in the study area are provided with kitchen facility. It is necessary to note that even when the kitchens are provided, some of the tenants carried out their cooking in unhygienic environment especially in the low-income residential zone in the study area. The drainages in the residential areas in the study area need much to be desired. Overall, just 51.3% of the residential property could boast of functional drainage. The provision of wall-fence round the residential property is to guide against unwanted interruption and ensure security and safety of property in the residential buildings. Only 58.4% of the residential buildings are provided with wall-fence, while 15, 89, and 143% of residential property in the low-income, medium-income and high-income residential zones respectively are correspondingly provided with wall-fence. Finding shows that 89.6% of the respondents agreed that they employed the services of security personnel in their neighbourhood. It is hope, that when residential property is provided with these infrastructure, such property would enjoy high patronage and consequently attract high rental value. Findings also establish that 77.1% of the respondents agreed that they have recreational facilities in their area while 70.2% of the respondent claimed to have access to medical facilities in the study area (Table 3).

Table 3. Infrastructural facilities available in the residential property in Ibadan North

Infrastructural facilities	Residential Zones			Total
	High	Medium	Low	
Electricity	128	132	143	403 (95.3%)
Water supply	79	125	142	346 (81.8)
Drainage	45	82	90	217 (51.3)
Access road	68	113	143	324 (76.5)
Security guard	27	109	143	379 (89.6)
Burglary proof	73	125	143	341 (80.6)
Fenced round	15	89	143	247 (58.4)
Kitchen	78	139	143	360 (85.1)
Bathroom/toilet	75	140	143	358 (64.3)
Waste disposal system	51	82	109	322 (57.2)
Recreation center	63	132	131	326 (77.1)
Medical center	65	97	135	297 (70.2)

Level of satisfaction of tenants with the infrastructural facilities provided in their rented residential property: The ranking of the of the level of residents satisfaction with infrastructure in Ibadan North in order of frequency as rated by respondents is as shown in table 4. As shown in table 4, burglary proof was seen as the strongest index of satisfaction in the study area, this was followed by security guard. Kitchen and fenced round ranked third and fourth respectively, while bathroom/toilet and access road ranked fifth and sixth respectively. Water supply ranked seventh, while drainage channel ranked lowest in the study area.

Table 4. Residents' satisfaction index with infrastructural facilities provided in their rented residential property

Variable	N	RSI	Rank
Water supply	344	2.28	7
Electricity	358	1.89	10
Access road	326	2.31	6
Refuse disposal	322	1.77	11
Drainage channel	357	1.64	12
Security guard	279	3.28	2
Burglary proof	341	3.54	1
Kitchen	360	2.97	3
Toilets/bathrooms	358	2.66	5
Fenced round	247	2.83	4
Recreational facilities	346	2.01	8
Medical center	297	1.93	8

Rental values of residential property in Ibadan North: Despite the low level of satisfaction on the infrastructural facilities available in their rented apartments, the annual rent paid by the tenants range from N50, 000.00 to over N200, 000.00 per annum. Table 5 reveals that 11.6% of the tenants paid less than N50, 000.00 per annum for their rented residential apartment. It is necessary to stress that this is only peculiar to the core area alone (Table 5). In the medium-income earner zone, none of the residential property is rented out less than N50,000.00 per annum. In the high-income earner zone, none of the residential property is rented out for more than N150, 000.00 per annum. However, the improved quality of infrastructural facilities provided and the hygienic environment could have been responsible for the high rent. Paradoxically, in spite the low level of infrastructural facilities provided in the core area, 2.9% of the residential property in the zone were rented between 100, 001 to 150,0000 per annum. The competitiveness over land, which the commercial land use posed to residential land use in the core area, was responsible for this high rental value for the residential property. Besides the information gathered on the rental values of residential property from the tenants in Ibadan, efforts were made to gather information on the rental values of the residential property from practicing Estate Surveyors and Valuers based in Ibadan. The basis for this is premised on their rich

professional background and in-depth knowledge of the property market in the study area.

Table 5. Rental values of residential property in Ibadan North

Infrastructural facilities	Residential Zones			Total
	High	Medium	Low	
< 50,000	49 (36.2)	-	-	49 (11.6)
50,001 to 100,000	86 (61.9)	10 (7.1)	-	96 (22.6)
100,001 to 150,000	4 (2.9)	84 (59.6)	12 (8.4)	96 (22.7)
150,001 to 200,000	-	35 (24.8)	42 (29.4)	77 (18.2)
> 200,000	-	12 (8.5)	89 (62.2)	101 (23.9)
Total	139 (32.9)	141 (33.3)	143 (33.8)	423 (100.0)

Source: Field Survey, 2018

Trend in property value: From the percentage increase in rental values, it can be seen in Table 6 that the self-contained units benefited from the road rehabilitation works the most with a 220% increase in its rental value, the 3-bedroom flats came in 2nd with a 150% increase in its rental values. Furthermore, Table 6 contains trends in rental values of various properties in the estate. The Table reveals that a general increase in rental values of properties in the study area. However, while tenement buildings experience annual rental review, rental values of other properties are reviewed every two years. This is possible due to the prevailing principle of rent review Nigeria as a whole.

Table 6. Trend in property value between 2008 to 2018

Element	2008 x 10^3	2009 x 10^3	2010 x 10^3	2011 x 10^3	2012 x 10^3	2013 x 10^3	2014 x 10^3	2015 x 10^3	2016 x 10^3	2017 x 10^3	2018 x 10^3
One room	25	30	30	40	40	50	50	60	60	75	80
Two-bedroom flat	75	85	85	95	95	100	100	120	120	150	180
Three-bedroom flat	80	80	100	100	120	120	150	150	180	180	200
Four-bedroom flat	80	100	100	120	120	150	150	180	200	2000	25

Source: Field Survey, 2018

Analysis of the relationship of the infrastructure variables: This section examines the relationships among the infrastructural variables Table 7 is the zero order Pearson product movement Correlation Matrix of the 12 key variables. The annual rent of the residential property has significant relationships with 8 of the variables. The annual rent is related to water, Burglary proof, refuse disposal facility, toilet, drainage, wall fence and security guard. The annual rent has 0.228 correlation coefficient with water supply at 0.05 level. This is an indication that an increase in annual rent would attract an improvement in water supply to the residential property. This is perfectly required to be true because tenants often based their demand for improved water supply either in the provision of new hand-dug well or reactivation of the existing hand-dug well based on the increase in rent. However, other infrastructural variables which annual rent maintains significant relationships with at 0.05 level are toilet with 0.096 and drainage channel with 0.184 correlation coefficient. Like water supply, both toilet and drainage channel maintain weak relationships. Toilet facility is a necessity in any functional residential building. Often times, when increased in rent is anchored on the provision of toilet, the quality of toilet provided is much to be desired. Rather than providing a water closet toilet, pit toilets are often provided, which are poorly maintained. The issue of drainage channel tells much on the environmental quality of the housing environment. Majority of the residential property in the core zone are located in degraded environment coupled with blocked drainages while in the Public housing zone, the aesthetics quality of few of the housing environment is high and with well-maintained drainages thus, the residential property in the zone attract high rental value. At 0.01 level, (5) of the infrastructural facilities (variables) maintain significant relationships with the annual rental value. These are installed burglary proof with 0.098 correlation coefficient, refuse disposal facility with 0.050 correlation coefficient; wall-fence with 0.278 correlation coefficient, and security guard with 0.032 correlation coefficient (Table 7). Tenants do not toil with the issue of security. This is because of increased cases of burglary in most Nigerian urban centers. Often times, tenants jointly arranged for security services to keep watch of their rented apartments at nighttime particularly at the peripheral and zones that appear to be isolated and solitary in the study area. Of all the security related variables, construction of wall-fence round residential property maintains the strongest relationship with rental value. It has a correlation coefficient of 0.278. This is followed by the installation of burglary proof in residential building with 0.098 correlation coefficient. Tenants

prefer localities where they can enjoy both security services, even if it will amount to paying additional money to their rent. Often times, on community basis, tenants engage security services for both day and night. This is mostly common in the study area. Overall, electricity, access road and kitchen have no significant relationships with rental value of residential property in Akure. One may wonder why these infrastructural facilities do not maintain significant relationships with rental value. This is not unconnected with the poor situation of electricity supply in Nigeria in general and in Ibadan in particular, some areas are without functional electricity transformer, which makes the tenants to live in perpetual darkness. Majority of the tenants depend on the use of generating plants for their electricity supply. Many of the tenants do not consider the condition of the access roads linking their rented apartment as too major; particularly in the core zone where most of the residential properties are poorly accessible or only accessible by footpaths. It is necessary to conclude that the security related infrastructural facilities and services contributed significantly to the rental values of residential property in the study area. These are the installation of burglary proof, provision of wall-fence and availability of day and night security services as well as the provision of refuses disposal facility. However, other infrastructural facilities that contribute to the rental values of residential property are provision of potable water supply, toilet facility and good drainage channels.

Table 7. Correlation matrixes of Pearson's correlation coefficient key rental value variables

	Annual rent	Water supply	Electricity	Access road	Refuse disposal	Drainage channel	Security guard	Burglary proof	Kitchen	Toilets & bathrooms	Fenced round
Annual rent	1.00										
Water supply	.228*	.1.00									
Electricity	.875	.029	1.00								
Access road	.611	.191**	.221	1.00							
Refuse disposal	.050	.041	.093	.162*	1.00						
Drainage channel	.184**	.027**	.092*	.050	.062*	1.00					
Security guard	.032	.183*	.045*	.142*	.09**5	.021*	1.00				
Burglary proof	.098	.239	.056**	.072**	.429	.097	.014*	1.00			
Kitchen	.698	.471	.0923	.069	.031	.058	.012	.054	1.00		
Toilets/bathrooms	.338*	.645**	.323	-.034**	.091	.020	.436*	.034**	.492	1.00	
Fenced round	.278	.215**	.193**	-.093**	.062	.094	.509**	.198	.098	.772**	1.00

Note: *Correlation is significant at 0.05 level; **: Correlation is significant at 0.01 level

Conclusion: The study revealed that that a considerable number of the respondents have been living in the study area long enough to give accurate responses concerning the focus of the study. Furthermore, the study showed that while rental values on tenement buildings are reviewed annually those of blocks of flats and bungalows are reviewed on two-yearly basis.. It has concluded that improved quality of infrastructural facilities contributed to the increase in the rental values of residential property.

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