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Prioritizing Residential Land Value Determinants in Onitsha, Nigeria

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Abstract

This study was undertaken to analyze the various determinants of residential land values and the strength of the different factors contributing to land value variations in Onitsha, Nigeria. The factor analysis and the principal component techniques were applied in the analysis of spatial variations and the relationship between 31 identifiable factors influencing residential land values in Onitsha, Anambra State of Nigeria. By using regression analysis, the 13 main factors shaping land values in Onitsha were established, prioritized and ranked as accessibility, neighborhood quality, land title, zoning regulations, transportation, rent, improvement tax, environmental quality, view of amenities, travel time to the city centre and irrevocable power of attorney.
Keywords: land value, spatial variations, prioritized, ranked, residential land, value determinants.

Introduction

Rapid urban developments have brought dynamic changes to large cities in the developing countries. Spatial distribution and locational characteristics of land development have changed dramatically and so also are land values. Land values have significant implications for the growth of an economy. Analyzing and explaining absolute land values are likely to shed light on the determinants of land price. The concept of urban land value is as old as the cities themselves and the importance of this concept grew over time since the introduction of land as a commodity in the market. Land values in Onitsha, Anambra State of Nigeria have been dramatically changing over the years, but no conscious effort has been made to systematically analyze the changes vis-à-vis the various components of land value determinants. The study therefore seeks to unravel the main factors influencing land values in Onitsha and their explanatory powers in land value determination.

Policy makers concerned with issues such as housing and land taxation, land-owners, lenders, tax assessors, prospective buyers, government agencies, urban planners,

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developers amongst others are very much interested in the various factors that determine urban land values which help to shape their decisions on the use of land.

Related Studies

Due to the importance of land in the overall welfare of any nation, change in land value pattern has engaged the attention of both the academic and professional communities over the last 30 years notably in the UK, USA and Australia. Various scholars and researchers such as Gallimore, Fletcher and Carter (1996), Dunse (1998),Wyatt (1997), Pieroni (1999), Sunderman and Birch (2000), Yomraliooglu and Nisanci (2004) have carried out extensive studies on the various determinants of land values.

Kauko (2003) listed a set of attributes that has been commonly used in property valuation research including accessibility factors, neighbourhood level factors, specific negative externalities, public services, taxes, and density factors.

In the Nigerian context, considerable amount of work has been done by scholars in various disciplines to explain the determinants, structures and effects of residential land use in Nigerian urban areas. The study carried out by Olayiwola et al (2003) examined the relationship that exists between various land value determinants in metropolitan Lagos, Nigeria. The study showed that a high level of co-variation existed between factors of land value such as accessibility, rent, and transport improvement, quality of neighbourhood, infrastructural facilities and government regulations. The need for land use planners to consider these land value determinants in putting land into optimum use were highlighted.

The study by Oduwaye (2005) examined land values in high density residential neighbourhoods in Metropolitan Lagos. The study identified that residential segregation exists in Nigerian cities and the study area. The findings reveal that there are strong relationships between the residential land value variables employed in the analysis namely rent, cost of purchase of apartment and cost of a plot of land.

The outcome of the study showed that infrastructural facilities and economic variables are the major determinants of residential land values in high density residential neighbourhoods in Lagos metropolis.

Ogbuefi and Egbenta (2002) studied the relationship between transport services and property values in Enugu, Nigeria. They used linear regression analysis to determine the relationship between the mean monthly rental values and time distance by bus. Rental values of substantially similar properties in sixteen neighbourhoods having different levels of time distance to the central business area were compared in the study. The major variables employed were the monthly rental data (1990-2000) property characeteristics and distance measured by time to the CBD. Their study concluded that time distance is a very poor predictor of value and that with good transportation services people can afford to stay anywhere outside the city centre and enjoy the services provided in the CBD.

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They agreed that there are several and complex factors that should be considered in analyzing rental value and that location factors in relation to the distance alone are not a significant predictor of value.

In another study, Udo and Egbenta (2007) looked at the effect of domestic waste dumpsites on rental values of residental properties In Enugu. Multiple linear regressions were employed and the evidence suggests that there is no relationship between rental values of property and closeness to waste dumpsites. They concluded that contrary to expectation, the nearness of properties to waste dumpsites does not necessarily affect property values negatively.

It is to be noted that the studies by Ogbuefi and Egbenta (2002) and Udo and Egbenta (2007) only employed one variable each in their analysis instead of many other several and complex factors.

This study attempts a comprehensive investigation into the factors influencing residential land values in Onitsha, Anambra State of Nigeria. The analysis of the various factors influencing land values in Onitsha and how the contribution of different variables to land value variation changes with time is the main focus of this research.

The Study Area

Onitsha (Igbo: Onicha Mmili or just Onicha) is a city, commercial centre and river port on the bank of the Niger River in Anambra State, southeastern Nigeria. As of 2001 Onitsha had an estimated population metropolitan population of 1,003,000.

Onitsha lies at a major east-west crossing point of the Niger River and occupies the northernmost point of the river regularly navigable by large vessels. The city is located between latitudes $6^0$07'N and $6^0$12'N and longitude $6^0$45'E and $6^0$50'E.

Onitsha is reputed as having the biggest single open air market in the whole of West Africa and has perhaps the most active property market in Anambra State.
Onitsha, the city on the Niger, to a large extent, owes its early development to its advantage of site and situation. The city is sited where a low elevation, the western continuation of the Awka-Orlu uplands and part of the cuesta landscape of south-Eastern Nigeria, runs athwart the Niger and continues westwards through Asaba and Ogwashi-Uku. Onitsha is, therefore, located at the gateway between two contrasting regions east and west of the Niger. As a water-way, the Niger provides a link with the savanna zone to the north and the forest and the delta regions to the south. These advantages of site and situation led to the early development of Onitsha as a commercial centre. (Okoye, 1996).

In 1965, the Niger River Bridge was built across the Niger River to replace the ferry crossing. Today, Onitsha is a modern day urban society. There is a catholic cathedral, Anglican cathedral and it is the headquarters of so many church organizations and socio-cultural groups. A federal government college is situated in the town. There is an army barrack, a school of metallurgy, and it is the home of the biggest open-air market in the whole of Africa, the Onitsha Main Market. The state of Lagos and various northern towns

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are partially fed by supplies from Onitsha. Trade soared between the east and west of Nigeria because of Onitsha market. This made Onitsha the strategic gateway for trade between the former eastern and western regions. The Nigerian-Biafran war brought widespread devastation to the city; at its end came the subsequent oil boom years bringing a huge influx of immigrants into the rural-urban exodus into the city. (Wikipedia, 2011).

The 15 identified residential layouts/estates in Onitsha are shown in Table 1

Table 1. The Fifteen (15) Identified Residential Layouts/Estates in Onitsha.

1) G.R.A Onitsha
2) Akpaka GRA
3) Federal Housing/3-3 Area
4) Federal site and services
5) Trans-Nkisi Layouts
6) Onitsha Inland Town
7) Omagba Layout
8) Modebe Avenue & Adjoining Streets
9) Old Market Road & Adjoining Streets
10) New Market Road & Adjoining Streets
11) Oguta Road & Adjoining Streets
12) Awka Road & Adjourning Streets
13) Woliwo Layout
14) Odoakpu
15) Fegge

Source: Researchers' Field Survey (2009)

Materials And Methods

The study population comprises residential plots in the residential layouts and estates of Onitsha. The sample is limited to residential properties because residential properties (owner-occupied and investment) represent the largest stock of real estate assets in Anambra State like most cities of the world.

Furthermore, the market for residential properties is often the most active submarket where sufficient information can be readily garnered for the type of analysis required.

The data for this study were derived from primary and secondary sources. The primary data were obtained through questionnaire administration. Various agencies and professionals were contacted during field survey. The following sources formed the main base for extracting data for the dependent and independent variables: Land value data from the Ministry of Lands, Survey and Urban Planning, Anambra State, Anambra State Housing Development Corporation (ASHDC), Federal Ministry of Works, Housing and Urban Development, Anambra State Office, Awka, Professional Estate Surveyors and Valuers and

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Practicing Estate Surveying and Valuation Firms. Secondary data for the study were sourced from journals, text books, seminar/conference papers and maps.

The 31 identified major determinants of land values in the residential neighbourhoods of Onitsha include the following namely Erosion, Security, Industrial Pollutants, View of Amenities, Water View, Level of Owner Occupation, Open spaces and parks, Ground Rent, Consent fee, Infrastructural Development levy, Capital Gains Tax, Pipe Borne Water, Electricity, Road, Sewage Disposal, Recreational Facilities, Travel Time to city Centre, Distance to Hospital, Distance to Market, Travel time to school, Access to main road, Access to public transportation, Designation of Layouts/estates into high, medium and low density residential areas, Building types to be built in a residential layout/estate, Land/building size ratio, Subdivision regulations, Certificate of occupancy, Deed of Assignment, Irrevocable power of Attorney, Sublease, and Rental Income.

A total of 750 questionnaires were distributed through random sampling to respondents in Onitsha out of which 606 were returned representing about 80.8% of the respondents. Out of the returned questionnaires, a total of 589 valid responses were used in the analysis of data. Data (31 by 589 data matrix)relating to the major determinants of land values in the residential neighbourhoods of Onitsha were generated with the aid of a five-point Likert scale and well-structured questionnaires administered on Estate Surveyors and Valuers and sampled residents of the 15 residential neighbourhoods in Onitsha. This is essentially to test the extent of agreement or disagreement, while the order ranges from 1 as Strongly Disagree, 2 as Disagree, 3 as Undecided, 4 as Agree and 5 as Strongly Agree.

Methods of Data Analysis

Descriptive and inferential statistics are employed to interpret or explain the associations and relationships found among the groups of data, and inferences and conclusions are drawn from these relationships. Data were analyzed and evaluated by means of statistical computing package – Statistical Package for Social Sciences (SPSS). In particular, the following statistical techniques were employed namely Correlation Analysis, Factor Analysis (Principal Component Analysis), Multiple Regression Analysis (MRA). MRA was used to evaluate the variables that influence land values. Multiple Regression Analysis (MRA) measures the relative influence of independent variables on a dependent variable. In MRA, a dependent variable is regressed against a set of independent influencing variables. It uses various parameters including coefficient of determination (R^2) and t-test.

Data Analysis And Discussions

The factor analysis and the principal component techniques were applied in the analysis of spatial variations and the relationships between factors influencing residential land values in Onitsha. The responses on the following determinants of land values namely X_1 (Erosion), X_2 (Security), X_3 (Industrial Pollutants), X_4 (View of Amenities), X_5 (Water View), X_6 (Level of Owner Occupation), X_7 (Open spaces and parks), X_8 (Ground Rent), X_9 (Consent fee), X_{10} (Infrastructural Development levy), X_{11} (Capital Gains Tax), X_{12} (Pipe Borne Water), X_{13} (Electricity), X_{14} (Road), X_{15} (Sewage Disposal), X_{16} (Recreational Facilities), X_{17} (Travel Time to city Centre), X_{18} (Distance to Hospital), X_{19} (Distance to Market), X_{20} (Travel time to

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school), X_{21} (Access to main road), X_{22} (Access to public transportation), X_{23} (Designation to Layouts/estates into high, medium and low density residential areas), X_{24} (Building types to be built in a residential layout/estate), X_{25} (Land/building size ratio), X_{26} (Subdivision regulations), X_{27} (Certificate of occupancy), X_{28} (Deed of Assignment), X_{29} (Irrevocable power of Attorney), X_{30} (Sublease), and X_{31} (Rental Income), were used as variables.

Results

In order to ensure that our respondents actually understood each of the thirty-one variables as distinct from one another, we carried out a correlation test where the correlation coefficient is the decision parameter. If the correlation coefficient between two variables is very close to unity (1.0) it means that the two variables are so close to each other and hence, cannot be distinguished from each other statistically showing that they are dependent on each other. The results of the correlation showed that all the variables are distinct since the values obtained are all very small (close to zero). This established that the respondents actually believed that each of the factors is important in determining the value of land in Onitsha.

Having established that the respondents actually believed that each of the factors is important in determining land values in Onitsha, a further analysis of the variables was done through the application of principal component analysis aimed at making each factor independent of each other. The mechanism of varimax rotation of factor loading based on minimum eigen value of 1.0 was employed.

The results of the principal component analysis displayed in Table 2 shows that thirteen (13) factors were extracted. This reduced the number of variables to be looked at in determining land values in Onitsha from the thirty one (31) initially proposed to the thirteen now selected. In Table 2, loadings that are equal or greater than 0.50 are considered to be high.

Table 2 Rotated Component Matrix[a]

		Component												
		1	2	3	4	5	6	7	8	9	10	11	12	13
Erosion	X_1	.018	-.017	-.006	.053	.020	-.133	.104	.037	-.034	.673	-.068	.032	.006
Security		-.044	.002	.225	.017	.104	.195	-.063	.011	.177	.541	-.025	-.368	.103
Industrial Pollutants	X_2	-.113	-.003	.237	.011	.190	.058	-.110	-.037	.074	.237	.457	.323	.160
View of Amenities	X_3	-.043	-.061	.082	.059	.080	-.001	-.013	-.020	.059	-.047	-.073	.804	-.030
Water View		-.019	-.033	-.023	-.002	.845	.079	.024	.000	.048	.082	.016	.079	.014
Level of Owner occupation	X_4	-.005	-.008	-.030	-.052	.857	.017	.017	.033	-.007	-.028	.026	.005	.013
Open spaces and parks	X_5	-.477	.240	.165	.003	.080	-.018	.004	-.074	.036	.032	.059	.237	.209
Ground Rent		.874	.011	.154	-.046	-.006	-.019	.025	-.002	.027	.003	-.025	.015	.043
Consent fee	X_6	.868	.050	.153	.005	.019	-.016	-.006	-.060	.011	.013	.009	.020	.020
Infrastructural Development levy		.290	.063	.692	-.024	-.034	.022	-.091	.021	-.021	.131	.032	.143	.033
Capital Gains Tax	X_7	.042	.065	.732	.065	-.055	-.010	.085	-.002	-.105	.014	.006	.015	-.062
Pipe Borne Water	X_8	.038	.616	.002	-.029	-.032	.113	.130	-.010	.010	-.049	.101	.110	.002
Electricity		-.030	.782	.078	.002	.045	-.082	-.073	-.050	-.001	-.063	-.090	-.083	-.125
Road	X_9	-.044	.758	.008	.056	-.054	-.014	-.078	.056	-.038	.100	-.008	-.090	.026
Sewage Disposal	X_{10}	-.048	-.053	.386	.105	.128	-.105	.155	.032	.007	-.313	-.192	.189	.251
Recreational Facilities		.001	.103	-.265	-.024	-.013	.074	.150	.125	-.052	.135	-.426	.259	.382
Travel Time to city Centre		.000	.044	-.118	.014	-.007	.051	.115	.080	-.036	-.102	.738	.086	.036
Distance to Hospital	X_{11}	-.042	.032	-.073	.037	.019	.813	.055	.040	.026	-.065	.062	.038	-.078
Distance to Market		.020	-.007	.058	.040	.075	.834	.016	-.044	-.015	.010	-.008	-.046	.023
Travel time to school	X_{12}	.018	.113	-.257	.538	-.056	.065	.049	.053	.162	-.048	.201	.015	.433
Access to mian raod	X_{13}	.014	.002	.067	.821	-.048	.097	-.003	.041	.014	.069	.054	.063	.045
Access to public transportation		-.066	-.013	.087	.763	.013	-.041	-.012	-.067	-.082	.002	-.096	-.013	-.195
Designation to Layouts/estates into high, medium nad low density residential areas	X_{14}	-.008	.005	.037	-.005	-.034	.050	.750	-.067	-.080	.268	-.009	.081	-.014
Building types to be built in a residential layout/estate	X_{15}	.039	.001	-.009	.001	.079	.012	.794	.017	.041	-.118	.074	-.076	.002
Land/building size ratio		-.183	-.142	.264	.032	-.075	.122	.343	.252	.262	-.199	-.132	-.045	.188
sibdivision regulations		.058	.098	-.014	-.036	.049	-.035	.000	.665	.119	-.184	-.081	-.076	.080
Certificate of occupancy	X_{16}	.019	-.022	-.035	-.008	-.012	.039	-.046	.709	-.092	.106	-.022	-.036	-.117
Deed of Assignment		-.129	-.097	.092	.055	.006	-.028	.042	.564	-.008	.134	.258	.122	-.117
Irrovocable power of Attorney	X_{17}	.019	.132	-.062	.086	-.038	.086	.029	.177	.170	-.028	-.032	.052	-.678
sublease		.118	.006	-.075	.032	.060	-.062	.123	.068	.683	-.007	-.072	.009	-.240
Rental Income		-.076	-.027	-.054	-.041	-.006	.057	-.118	-.058	.786	.039	.069	.043	.053

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization
a. Rotation converged in 11 iterations.

Table 3 Total Variance Explained

	Initial Eigen values			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
SN	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.174	7.014	7.014	2.174	7.014	7.014	1.936	6.246	6.246
2	1.893	6.105	13.118	1.893	6.105	13.118	1.725	5.565	11.811
3	1.815	5.856	18.974	1.815	5.856	18.974	1.623	5.237	17.048
4	1.647	5.314	24.288	1.647	5.314	24.288	1.597	5.151	22.199
5	1.595	5.144	29.433	1.595	5.144	29.433	1.567	5.055	27.254
6	1.471	4.745	34.178	1.471	4.745	34.178	1.513	4.881	32.134
7	1.427	4.603	38.781	1.427	4.603	38.781	1.483	4.783	36.917
8	1.296	4.182	42.963	1.296	4.182	42.963	1.425	4.598	41.515
9	1.195	3.855	46.818	1.195	3.855	46.818	1.310	4.226	45.741
10	1.120	3.614	50.432	1.120	3.614	50.432	1.175	3.791	49.532
11	1.100	3.550	53.982	1.100	3.550	53.982	1.171	3.778	53.310
12	1.062	3.426	57.408	1.062	3.426	57.408	1.157	3.731	57.041
13	1.025	3.307	60.715	1.025	3.307	60.715	1.139	3.673	60.715
14	.959	3.094	63.809						
15	.945	3.049	66.857						
16	.940	3.032	69.890						
17	.886	2.858	72.747						
18	.867	2.798	75.545						
19	.789	2.545	78.091						
20	.780	2.516	80.606						
21	.746	2.406	83.012						
22	.736	2.374	85.386						
23	.669	2.158	87.544						
24	.645	2.081	89.625						
25	.582	1.878	91.503						
26	.516	1.665	93.168						
27	.480	1.548	94.716						
28	.469	1.513	96.229						
29	.455	1.468	97.696						
30	.446	1.440	99.137						
31	.268	.863	100.000						

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Evidently from Table 2, the factors that loaded maximally in the first component are x_8 (Ground rent) and x_9 (consent fee) and were renamed Government land charges. In component 2, the factors that loaded maximally are X_{14} (Road), X_{13} (Electricity) and x_{12} (pipe borne water), renamed provision of infrastructural facility. For component 3 the factors that loaded maximally are x_{11} (Capital Gains Tax) and x_{10} (Infrastructural development levy) renamed Improvement Tax. In component 4, the factors that loaded maximally are x_{21} (Access to main road), x_{22} (Access to public transports) and x_{20} (Travel time to school) renamed Transportation. For component 5, the factors that loaded maximally are x_6 (level of owner occupation) and x_5 (water view) renamed Neighbourhood quality. In component 6, the factors that loaded maximally are x_{19} (Distance to market) and x_{18} (Distance to hospital) renamed Accessibility. For component 7, the factors that loaded maximally are x_{24} (Building types to be built in a residential layout/estate) and x_{23} (Designation of layouts/estates into high, medium and low density residential areas) renamed zoning regulations. For component 8, the factors that loaded maximally are x_{27} (certificate of occupancy) and x_{26} (subdivision regulations) renamed land title.

In component 9, the factors that loaded maximally are x_{31} (Rental Income) and x_{30} (Sublease) renamed Rent. In component 10, the factors that loaded maximally are x_1 (Erosion) and x_2 (Security) renamed Environmental Quality while in component II, only one factor x_{17} (Travel time to the city centre) loaded maximally, in component 12, only x_4 (View of amenities) loaded maximally and in component 13, only one factor x_{29} (irrevocable power of Attorney) loaded maximally.

The results of the principal component analysis showed that 13 eigen values equal to or greater than 1.0 were extracted.

Following from the results of Table 2, the 13 factors generated normalized cumulative variance explanation of 60.715% as shown by the rotated sums of squared loadings in Table 3.

Multiple Regression Analysis: This was undertaken determine the significant contributions of the 13 renamed factors in influencing land values in Onitsha.

$Y = \beta_o + \beta_1 f_1 + \beta_2 f_2 + \beta_3 f_3 + ... + \beta_{13} f_{13}$

Y = value of land as rated by 13 factors.

The estimated coefficients and their p-values are presented in Table 4

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Table 4: Contribution of Factors to Land Values

β	Value Rating (Coefficients)	P-value	Remark	Rank
β_0	105.221	0.000	Significant	-
β_1	1.027	0.000	Significant	12
β_2	2.515	0.000	Significant	6
β_3	2.302	0.000	Significant	8
β_4	2.562	0.000	Significant	5
β_5	2.792	0.000	Significant	2
β_6	2.917	0.000	Significant	1
β_7	2.570	0.000	Significant	4
β_8	2.595	0.000	Significant	3
β_9	2.317	0.000	Significant	7
β_{10}	1.82	0.000	Significant	9
β_{11}	1.166	0.000	Significant	11
β_{12}	1.719	0.000	Significant	10
β_{13}	0.611	0.000	Significant	13

Source: ***Researchers' Computation Based on Computer Out (SPSS) November, 2010.***

All the factors are significant based on their p-values. Since they are all significant, I then ranked them based on the magnitude of their contribution (β) by using the coefficients (value rating) of the independent variables. By the ranking done, factor 6 contributed more followed by factor 5, 8, 7, 4, 2 in that order. Others are factor 9, 3, 10, 12, 11, 1 and 13 respectively.

The result of the multiple regression analysis provides the measure for ranking the 13 factors influencing land values in the study areas based on the magnitude of their contribution. The following factors in their order of ranking from the highest to the lowest were the major factors influencing land value in the study areas – accessibility, neighborhood quality, land title, zoning regulations, transportation, provision of infrastructural facilities, rent, improvement tax, environmental quality, view of amenities, travel time to the city centre and irrevocable power of attorney. Table 5 is the summary of the ordered ranking of the 13 main factors influencing land values in Onitsha.

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Table 5: Summary of Ordered Ranking of Factors Influencing Land Values in Onitsha

Component	Name of Factor	Rank
1	Government Land Charges	12
2	Provision of Infrastructural Facilities	6
3	Improvement Tax	8
4	Transportation	5
5	Neighbourhood Quality	2
6	Accessibility	1
7	Zoning Regulations	4
8	Land Title	3
9	Rent	7
10	Environmental Quality	9
11	Travel Time to the City Centre	11
12	View of Amenities	10
13	Irrevocable Power of Attorney	13

Source: The Researchers, 2010.

Findings

From previous researches, the main factors influencing residential values can be divided into three aspects i.e. physical characteristics, location characteristics and temporal characteristics. This research has however been able to identify 31 variables influencing land values in Awka and Onitsha. In the overall analysis which combined all the 31 identified variables, all the 13 factors that underline the 31 explanatory variables namely government land charges, provision of infrastructural facilities, improvement tax, transportation, neighbourhood quality, accessibility, zoning regulations, land title, rent, environmental quality, travel time to the city centre, view of amenities and irrevocable power of attorney made significant contributions to the factors influencing land values in the study areas.

Conclusions

This study has been able to prioritize and rank the various determinants of residential land values and the strength of the different factors contributing to land value variations in Onitsha, Nigeria in the following order of importance namely accessibility, neighborhood quality, land title, zoning regulations, transport, rent, improvement tax, environmental quality, view of amenities, travel time to the city centre and irrevocable power.

Based on the findings and conclusions made in this research, there is need for special consideration to be given in policy formulation and planning to the 13 major factors influencing land values namely accessibility, neighborhood quality, land title, zoning regulations,

transportation, rent, improvement tax, environmental quality, view of amenities, travel to city centre and irrevocable power of attorney. These factors will guide urban planners and land managers in making sure that land are put into their highest and best use.

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