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Correlates of factors determining highest and best use of lands in housing estates in Lagos

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Abstract

Correlation coefficient is used to determine the strength of relationship between two variables. It is therefore apposite to run this process in the determination of the highest and best use of lands in residential estates. A total of 808 questionnaires were administered on landlords in Ikeja GRA (Low density), Ajao Estate, Isolo, (Medium density) and Oyadiran Estate (High density); 542 were found useful for the study. The variables considered for determination of HBU include, rental value (proxy for HBU), building type, accommodation, zoning regulation, land cost, plot size, accessibility, building cost, demand and market competition. Correlation matrix and Pearson's Correlation Coefficient are employed for data analysis. The study shows that in low density estates, there is strong relationship between HBU and accommodation; in medium density estates HBU has strong and positive relationship with accommodation, building cost and building type while in high density estates, there exist direct and strong association between HBU and accommodation, building type, building cost and land cost. It is recommended that urban land use economics analysts should consider these strong correlates in their decision to arrive at the highest and best use of lands in the estates.

Keywords: Correlation Analysis, Determinant Variables, Residential Estates, Nigeria

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1. Introduction

In order to be considered as the highest and best use (HBU) of a property, any potential use must pass a series of tests; generally the use must be legally permissible, physically possible, financially feasible and ,maximally productive (Boddy, 2002). Only those uses that are allowed may be considered as a potential highest and best use. This may exclude uses not allowed by zoning, uses forbidden by government regulations, and uses prohibited by deed restrictions or covenants. Every site has physical characteristics which determine its highest and best use. Some properties have value-enhancing views and frontages. Other properties are limited by poor access, steep topography, poor drainage or unstable soil. Financial feasibility is based on supply and demand, that is, finding out who are the potential buyers, tenants and customers. The use must have sufficient demand in the market place to have value. A use with no demand has no market value, and therefore cannot be considered a highest and best use. Finally, the use must yield the maximum market value for the property. A vacant site may have possible residential, commercial and industrial uses that pass all three previous tests. However, only one can be the highest and best use. The use that would yield the maximum value would be the highest and best use. From the foregoing explanation of the major factors of HBU are the variables used in this study for correlation analysis of the determinants of the highest and best use of residential lands in Lagos.

1.1. Correlation analysis

Correlation analysis is a process of showing the strength of linear relationship between two variables. It is the quantitative index that measures the pattern of variation of one variable vis – a – vis the other and the level of association or relationship between them (Okoko, 2001).Correlation coefficients value of 'r' lies between +1and -1. Positive values of 'r' indicate positive correlation between the two variables (i.e. changes in both variables take place in the statement direction), whereas negative values of 'r' indicate negative correlation i.e., changes in the two variables taking place in the opposite directions. A zero value of 'r' indicates that there is no linear association at all between the variables. When r = (+)1, it indicates perfect positive correlation and when it is (-)1, it indicates perfect negative correlation, meaning thereby that variations in independent variable (x) explain 100% of the variations in the dependent variable (y).The value of 'r' nearer to +1 or -1 indicates high degree of correlation between the two variables. The most commonly used standard analytical techniques to calculate correlation coefficients are Spearman's rank correlation coefficient (r s) when data are available at nominal and ordinal scales; Pearson's product moment correlation coefficient (r) when data are on interval and ratio scales; and the Point biserial correlation coefficient (r p b) when one variable is available on interval or ratio scale and the other variable is on nominal scale (e.g. binary or dichotomous or dummy variable).

1.2. Research variables

The variables included in this study are premised upon earlier works of Addae-Dapaah (1999), Desoto (2000), Kassides (2000), Bertaud (2001) and Trutnev et al. (2004) all on determinants of residential land use efficiency. In addition to these in the literature is the concept of highest and best use as amplified by Boddy (2002), Goldstein and Goldstein (2004) and Tideman (2006). Some of the variables found in the literature

are however adapted to suit the Nigerian local context. The definition of highest and best use as found in the literature must be legally permissible, physically possible, financially feasible and maximally productive (Boddy, 2002). Therefore, for legal permissibility, zoning and rezoning regulations, legal title on land, and planning restrictions are included. The highest and best use exclude uses not allowed by zoning, uses forbidden by government regulations and uses prohibited by deed restrictions and covenants. For physical possibility, variables such as terrain, soil texture, accessibility, plot size, estate size, building design and building condition have been included. The positive and negative physical characteristics of every site determine its highest and best use (Bertaud, 2001). Financial feasibility according to Boddy (2002) is based on demand and supply, hence, the inclusion of demand as a variable in the study. Tideman (2006) asserts that if the tax that must be paid on a transaction is greater than the gains, then the tax precludes any mutually advantageous trade. On this premise, tax has been included as a variable for the determination of highest and best use. Other variables such as infrastructure cost, road, drainage, electricity, water, sewage, security, maintenance, land and building costs are included for the computation of the expenditure aspect of the highest and best use accounting. The income (revenue) aspect calls for the inclusion of the annual rental value and accommodation units. The presence or absence of market competition determines the quality of product and the strength of the investment towards returns and growth. The type of building is included as one of the variables considered to account for the factor of maximum productivity in highest and best use concept. Only one use i.e. the use that would yield the maximum value among the types of residential buildings would be the highest and best use.

2. Study area

Metropolitan Lagos is located within Lagos State in the south-western part of Nigeria. Although, there is no existing universally accepted definition of what constitutes Metropolitan Lagos, the Master Plan Unit of the Ministry of Economic Planning and Land Matters once defined it as “the area stretching from Lagos Island in the south to Agege and Isheri in the north, Ojo town in the west and Ikorodu town in the east”. It is located approximately on latitude 6^{o} 22’N and 6^{o} 52N and longitude 2^{o} 42’E and 3^{o} 22’E.

Metropolitan Lagos consists of 16 urban local governments out of the 20 local government areas in Lagos State (FGN, 2007). Lagos population according to the National Population Commission (2006) is 9.2 million. This figure is, however, being disputed by the Lagos State Government which claimed to have recorded a figure of about 18 million from a parallel census enumeration carried out. Residential areas occupy the single largest proportion of 8,939 hectares (51.9% of land area), (Oduwaiye and Dekolo, 2007). Residential estates of low, medium and high densities are identified in the metropolis (Oduwaiye, 2001).

3. Research method

The design adopted for this study is descriptive while the sampling methods are purposive and stratified. The list of estates (sampling frame) is arranged into three strata of low, medium and high densities. In order to include some important estates, one residential estate is chosen from each stratum using purposive sampling

method. The purposive sampling method helps to choose the estates that adequately represent all the estates in each stratum. In this wise, the following estates are chosen: Ikeja GRA, (low density); Ajao Estate-Isolo, (medium density); and Oyadiran Estate (high density). These estates are chosen due to their unique characteristics in terms of density, geographical location and ownership. The sample size from each of the estates has been determined statistically using Yamane (1967) model of estimating an appropriate sample size of a finite population. A total of 808 questionnaires were administered on the landlords in the studied estates while 542 were returned and found useful for analysis. The study considers the following variables namely: annual rental value (proxy for HBU), building type, accommodation units, zoning regulation, land cost, plot size, accessibility, building cost, market competition and demand. These variables are identified through review of related literature and the concepts of highest and best use of lands as vacant or developed. Correlation matrix and Pearson's product moment correlation coefficient are used for data analysis.

4. Results and discussion

4.1. Correlates of HBU in low density residential estate (Ikeja GRA)

Table 1 presents the correlation matrix of the dependent and independent variables determining the highest and best use of land in Ikeja GRA. This is done to highlight the relationship of each of the independent variables with one another and with the dependent variable.

The table shows that the independent variables are correlated with the dependent variable. The relationship among the independent variables is moderately high while colinearity among them is almost non existence. The relationships of the predictor variables with the criterion variable are all positive except for accessibility and market competition. The result of this analysis shows that the chosen predictor variables are correlated with the criterion variable and can fit in well in modelling for highest and best use of land in the estate.

The results of the output on the nature of association between annual rental value and the variables determining highest and best use in Ikeja GRA are shown in Table 2. From the data in Table 2, accommodation has the highest level of association with a correlation coefficient of 0.859. The result shows a very strong positive (direct) relationship with annual rental value used as proxy for highest and best use of residential land as developed. The correlation coefficient is significant even at 99% confidence level. The result further shows that the number of accommodation units in a residential building has a strong direct relationship with the amount of rent accrued on such property. In other words, the higher the number of accommodation units, the higher the property value.

True to this assertion, a four bedroom bungalow is expected to command a higher value than a two bedroom bungalow if all other factors are kept constant. Building type is the next variable with direct relationship with annual rental value with correlation coefficient of 0.368. Even though the coefficient is low, it can be regarded as being at moderate level on a general scale. Moreover, the correlation is significant at 99% confidence level. This shows a direct relationship even though relatively weak between highest and best

use, and the type of residential building involved. In the property market, tenement building, blocks of flats, duplex and detached houses command values in ascending order respectively. A distortion in this order may be attributable to the number of accommodation in the buildings. Other variables with positive and significant levels of association are land cost (0.245) plot size (0.205) building cost, (0.254) and demand (0.162). A shrewd investor in property development may have to put into consideration the cost of land purchased for decision on the type of appropriate building to erect on such land. It is usually presumed that a property investor will not erect a building worth less than the cost of the bare land. The relationship between building cost and highest and best use is direct and significant but weak. This is true of the rule of thumb in estate surveying and valuation that cost is not synonymous with value. The two are different but related to each other. The size of a plot, though having direct relationship with property value, it does not contribute much to its highest and best use, likewise demand.

Table 1. Correlation Matrix of HBU Determinants in Ikeja GRA (Low Density)

	ARVA	**BU TYPE**	**ACCOMO**	**ZONRE**	**LACO**	**PSIZE**	**ACCESS**	**BUCO**	**DEM**	**MKT COM**
ARVA	1.000									
BU TYPE	.368	1.000								
ACCOMO	.859	.669	1.000							
ZONRE	.040	.024	.040	1.000						
LACO	.245	-.186	.049	.006	1.000					
PSIZE	.205	-.205	.009	-.009	.921	1.000				
ACCESS	-.097	-.039	-.068	-.140	.171	.115	1.000			
BUCO	.254	-.128	.166	.095	.390	.405	.170	1.000		
DEM	.162	.232	.212	-.139	.219	.140	.201	.166	1.000	
MKT COM	**-.021**	**.001**	**-.107**	**-.038**	**.284**	**.200**	**-.051**	**-.229**	**271**	**1.000**

Source: Analysis of Survey Data, 2012

Table 2. Pearson Correlation Analysis of Highest and Best Use Determinants In Ikeja GRA (Low Density)

HBU Determinants	Correlation coefficients	Significance 1-tailed	N
Building type	.368**	.000	155
Accommodation	.859**	.000	155
Zoning Regulation	.040	.310	155
Land cost	.245**	.001	155
Plot size	.205**	.005	155
Accessibility	-.097	.116	155
Building cost	.254**	.001	155
Demand	.162*	.022	155
Market Competition	-.021	.398	155

Source: Analysis of Survey Data, 2012

*Note: * Correlation is significant at 0.05 (i.e. 95% confidence) level*

*** Correlation is significant at 0.01 (i.e. 99% confidence) level*

Market competition and accessibility recorded negatively weak and moderate levels of association with HBU with figures of -0.021 and -0.097 respectively. This means that the data correlation shows that as market competition from property market improves the rental value of the study estate reduces. This phenomenon follows the simple economic law of an increase in supply of a commodity to the market thereby bringing down the price of the commodity. In the case of accessibility, it shows that the expected improvement in rental value when roads are rehabilitated in the estate has not yielded expected positive effects. Moreover, the weak and negative correlation of accessibility to the determination of highest and best use of the estate can be attributed to the heavy traffic jam in all parts of Lagos. Hence, accessibility does not significantly contribute to the rate of change in annual rental value.

4.2. Correlates of HBU in medium density residential estate (Ajao Estate)

Table 3 shows the correlation matrix of the explanatory variables for easy understanding of the relationships between them.

Table 3. Correlation Matrix of HBU Determinants in Ajao Estate (Medium Density)

	ARVA	BU TYPE	ACCOMO	ZONRE	LACO	PSIZE	ACCESS	BUCO	DEM	MKT COM
ARVA	1.000									
BU TYPE	.368	1.000								
ACCOMO	.788	.509	1.000							
ZONRE	.032	-.011	.016	1.000						
LACO	.056	-.220	.023	-.088	1.000					
PSIZE	.040	-.226	.046	-.101	.792	1.000				
ACCESS	-.036	-.042	-.053	-.067	.045	.018	1.000			
BUCO	.548	-.012	.421	.093	.051	.008	.004	1.000		
DEM	.059	.008	.013	.090	-.030	-.046	.396	.041	1.000	
MKT COM	**.075**	**.020**	**-.058**	**.006**	**-.119**	**-.064**	**.170**	**.110**	**.322**	**1.00**

Source: Analysis of Survey Data, 2012

The result shows that the independent variables are moderately correlated with the dependent variable individually. Moreover, colinearity among the variables is almost non existence. The correlation matrix shows that there are associations between annual rental value (used as proxy to HBU) and each of the variables used. Furthermore, accommodation and building cost are highly and positively associated with annual rental value.

Table 4 shows the result of the relationship between annual rental value and the predictors of the highest and best use of medium density residential estate of Ajao in Lagos. The data output in Table 4 reveals that accommodation has the highest figure of association with annual rental value (proxy for HBU) with a correlation coefficient of 0.788. This is a very strong and positive relationship showing that an improvement or increase in the number of accommodation units in a building will bring about an increase in rental value. In essence, the highest and best use of such property will be that use that commands the highest rent. Furthermore, the table shows that the relationship between accommodation and rental value is absolutely

significant even at 99% level of confidence. Building cost is the next variable that has a strong and positive correlation with annual rent on the table. The coefficient of correlation is 0.548 which is also absolutely significant at 99% level of confidence. Form this result, it can be explained that a prudent investor will always consider his capital outlay in an investment, in this case the cost of the building before accepting rent offer. Even though, it has been argued that cost is not synonymous with value, it usually serves as a basis in determining the value of a property. All things being equal, a property investor will not accept less than what it cost him to develop a building in a sales transaction.

Table 4. Pearson Correlation Analysis of HBU Determinants in Ajao Estate

HBU Determinants	**Correlation coefficient**	**Significance 1-tailed**	**N**
Building type	.368*	.000	228
Accommodation	.788*	.000	228
Zoning regulation	.032	.314	228
Land cost	-.056	.200	228
Plot size	-.040	1.275	228
Accessibility	-.036	.297	228
Building cost	.548*	.000	228
Demand	.059	.189	228
Market competition	.075	.130	228

Source: Analysis of Survey Data, 2012

**Correlation is significant at 0.01 (i.e. 99% confidence) level*

Building type also has a positive association with annual rental value with a coefficient of 0.368. However, the association is weak considering the low correlation coefficient. Interestingly, the relationship is significant at 0.01 (99% confidence) level. This scenario is understandable because a medium density residential estate is usually inhabited by the middle class (medium income group) in the society. This class may not dwell so much on the type of building but the number of accommodation units therein. Market competition, demand and zoning regulation all have positive but very weak association with rental value in

medium density residential estates. The correlation coefficients of the variables are 0.075, 0.059 and 0.032 respectively and are not significant at any acceptable level of confidence. In other words, a change in any of the three variables may not have any noticeable effect on the rental value of the estate properties. Land cost, plot size and accessibility have inverse relationship with rental values in medium density estates.

4.3. Correlates of HBU in high density residential estate (Oyadiran Estate)

Correlation coefficient matrix of the variables considered for HBU in Oyadiran Estate is shown in Table 5 for identification of the relationship among them.

Table 5. Correlation Matrix of HBU Determinants in Oyadiran Estate (High Density)

	ARVA	**BU TYPE**	**ACCOMO**	**ZONRE**	**LACO**	**PSIZE**	**ACCESS**	**BUCO**	**DEM**	**MKT COM**
ARVA	1.000									
BU TYPE	.320	1.000								
ACCOMO	.652	.561	1.000							
ZONRE	-.019	-.055	-.006	1.000						
LACO	.204	-.103	.116	.067	1.000					
PSIZE	.068	.110	.098	-.007	.213	1.000				
ACCESS	.038	.090	.147	-.071	.140	.116	1.000			
BUCO	.169	-.021	.142	-.056	.088	.185	.057	1.000		
DEM	.061	-.152	.019	-.037	.047	-.203	.192	.143	1.000	
MKT COM	**.034**	**-.138**	**-.012**	**.058**	**.112**	**-.125**	**.231**	**.003**	**.447**	**1.000**

Source: Analysis of Survey Data, 2012

The correlation matrix in Table 5 shows that the independent variables are related to the dependent variable, though the degree of association is relatively low except for accommodation which is highly related

to the criterion variable. Co-linearity among the predictor variables are non existence meaning that each of them is important in the determination of the highest and best use of residential lands in the estate.

The result from computer output on the relationship between the variables determining the HBU of residential land in high density residential estate in Lagos is in Table 6.

Table 6. Pearson Correlation Analysis of HBU Determinants in Oyadiran Estate

HBU Determinants	Correlation coefficient	Significance 1-tailed	N
Building type	.320**	.000	159
Accommodation	.652**	.000	159
Zoning regulation	-.019	.408	159
Land cost	.204**	.005	159
Plot size	.068	.196	159
Accessibility	.038	.316	159
Building cost	.169*	.017	159
Demand	.061	.224	159
Market competition	.034	.337	159

Source: Analysis of Survey Data, 2012

** Significant at 0.05 level*

*** Significant at 0.01 level*

From Table 6, building type, accommodation, and land cost are positively correlated to annual rental values at a significant level of 0.01 i.e. 99% level of confidence. Another variable that is positively associated with annual rental value is building cost at 0.05 significant level (95% confidence level). Accommodation has the highest level of correlation with coefficient of 0.652. The strong correlation with rental value especially in high density residential area is the importance attached to the number of accommodation units. In this case, the number of bedrooms in an apartment means much more than facilities and other architectural embellishments that may enhance property value in a low density areas. In other words, the higher the number of accommodation provided in a building, the higher the value and hence the highest and best use for

that plot of residential land. Building type though has relatively weak but positive correlation with rental value.

The correlation is also absolutely significant. The type of building in a high density area that can accommodate more people such as block of flats and high rise tenement buildings are preferred and common. Detached and duplex houses are not common, for they are occupied by single families who cherish ample space.

Land cost is also positively and significantly associated with rental value showing that an increase in land cost will have a positive effect on rental value. This can be explained on the basis that an investor in property will not purchase a very high valued plot of land only to put a low valued building on it. The higher the cost of the land, the higher the propensity to develop to the highest and best use of the land. In the same vein, if the building cost is high, the value is likely to be high especially when it is developed for investment purposes. This explains the positive and significant relationship between building cost and rental value in high density residential areas. Furthermore, the table shows that plot size, accessibility, demand and market competition have positive but weak correlation with rental value. However, the correlations are not statistically significant at any acceptable level. The weak association of these variables to rental value can be attributed to the class of people occupying high density residential area. These are relatively low income group who are not ready and willing to pay more in terms of rent for any improvement in plot size and accessibility. Any change in these variables therefore does not significantly affect rental income on the property. Zoning regulation has inverse relationship with rental value but at no significant level. This means that a more enforcement of zoning regulation in high density residential estate will negatively affect property value. Building codes and zoning regulations might specify the types and heights (storeys) of buildings thereby cutting down the number of accommodations units that might have increased the rental earnings on such properties.

5. Conclusions and recommendation

The results of the study show that in low density estates, there is strong and significant relationship between highest and best use and accommodation units in a property. The type of building, land cost, plot size, building cost and market demand also have positive, significant but weak correlation with highest and best use. In Ajao Estate (medium density) there are strong and direct relationships between HBU and accommodation, building cost and building type in the determination of highest and best use. In the determination of HBU in high density estate (Oyadiran Estate) it is discovered that positive significant correlations exist between HBU and accommodation, building type, land cost and building cost. From this analysis, it is recommended that urban residential land use analysts should consider the strength of the association or relationship (whether strong or weak, positive or negative) between the independent variables chosen and HBU. In this wise, cognisance should be taken of the variables that have strong and positive correlation with HBU.

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