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Nexus International University ISSN: *3007-1682*; 9(4): 111- 119

Drivers of the Transition from Residential to Commercial Land Use in Akure, Nigeria

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Abstract. This research investigated the factors driving the transition from residential to commercial land use within the central Area of Akure, Nigeria. Data were gathered through structured questionnaires distributed to 220 property owners and tenants in the study zone and 25 active Estate Surveying and Valuation firms in Akure, as identified in the Nigerian Institution of Estate Surveyors and Valuers directory for the year 2022. The collected data underwent analysis employing the discriminant function analysis method. The findings from this study pointed to the significant role of property value exploitation (with a standardized canonical discriminant function coefficient of 0.634) as the primary predictor of land use changes. Government policy (-0.630) and considerations of the highest and best use of properties (-0.575) also exhibited notable influences, as indicated by their standardized coefficients in the discriminant function analysis. As a result of these findings, it is recommended that the government capitalizes on the investment potential of this transformation to enhance its internally generated revenue. Additionally, urban planning authorities should devise strategies to regulate and accommodate the expansion of the city's core area.

Keywords: Land Use Change, Government Policy, Commercial Land Use, Estate Surveyors and Valuers

1. Introduction

It is a prima facie fact that land forms the bedrock for all human activities and development, always dangling within the varying man's needs and decisions (Adegunle, Fateye, and Agbato, 2016). However, land is fixed in supply, resulting in competition between various land uses. According to Roger (2012), 'humans are likely the premier geomorphic agent currently sculpting earth's surface due to its numerous activities.' With various land uses, the landscape is modified and commonly degraded by several human activities; mining, infrastructure expansion, and urban development are obvious ones with consequent results on urban land use. Prince and Florence (2013) further described land use change as analyzing the relationship between man and land. Thus, with the hope of meeting current economic realities, change in land use becomes inevitable to achieve socio-economic satisfaction and exploit prevailing opportunities availed by land use dynamism.

Land use dynamism is a function of urban transformation as there have been changes over time on land from crop-land, pastures, and forests to various planned and zoned urban developments. Land use changes are, therefore, closely associated with urban development. According to Arshad and Shabab (2012), urban transformation is where land use changes are observed at different periods; such land is in a continuous state of transformation due to various natural and artificial processes resulting from land use changes. Emmanuel and Wan Zahari (2016) noted that changes in urban land use in any society and country are inevitable irrespective of the genesis and nature of the changes because such changes are part of urban growth and transformation required for the development of the society. Increased migrations, urbanization, and population surges have resulted in a general increase in the demand for land in urban centre around the globe, resulting in competition for various land uses in most urban centers.

According to Goertz, Shortle, and Bergstrom (2005) and Emmanuel and Wan Zahari (2016), land use reflects and defines both where economic activity takes place and where and how communities develop. These economic activities include but are not limited to residential, commercial, public, recreational, industrial, and circulation or transport land use. The

growth of urban centers requires space for expansion to accommodate the population and other urban land uses. This has resulted in increasing competition and demand for land among the growing population of urban centers and, as a result, changes in land use. The continual transformation of land from one service to the other is always initiated by urbanization (Ogunleye, 2005).

According to Yuri (2005), Ayotaminu, Gobo, and Owei (2010), Gbadamosi and Ibrahim (2013), and Adegunle *et al.* (2016), several factors influence land use changes, some of which include the need for enhanced use of the land; the interplay between the force of demand and supply; planning regulations; complementary use; infrastructural facilities; accessibility; population size; rent; circulation network where the impacts of the resultants increase in land uses have been attributed to traffic congestion; housing shortage; pressure on existing infrastructural facilities; increase in rent; high crime rate and poor road network.

Against this background, this research is poised to study land use changes at the city core of Akure to take advantage of urban land use potential. Since the creation of Ondo State in 1976, Akure has undergone tremendous development, which ranged from physical, population, and social constituents, which had led to land use changes with its resulting impact on the interaction between the various land uses.

2. Literature Review

It is almost unanimously accepted that there are two main categories of land use change: bio-physical and socio-economic factors (Turner, Skole, Sanderson, Fischer, Fresco, and Leemans, 1995). The bio-physical factors include characteristics and processes of the natural environment, such as weather and climate variations, landforms, topography, volcanic eruptions, plant succession, soil types and processes, drainage patterns, and availability of natural resources.

The socio-economic factors comprise demographic, social, economic, political and institutional factors and processes such as population and population change, industrial structure and change, technology and technological change and the related policies and rules, values, and norms. The bio-physical drivers usually do not cause land use change directly; they do cause land-cover change, which may influence land owners/managers (e.g., no farming on marginal lands).

Several researches have been conducted on factors influencing land use changes. Raharjo (2005) identified the factors influencing changes in land use as neighbourhood characteristics, accessibility, government policy, exploitation of property value, the low capability of the municipality and local administrative officer in the development plan, and control and loss priority of municipality program for inner City revitalization especially for the residential Area.

Egbenta (2010) analyzed residential land use change in Enugu by using administered questionnaires on property owners and renters in Enugu who had changed the use of their buildings from the original service. The study used simple percentages and tables for its data analysis. It revealed that profit maximization arising from the increasing demand for commercial uses and the obsolescence of residential buildings due to physical ageing contribute to increased commercial land use in Enugu.

Lamparte, Riveira, and Maseda (2010) analyzed the factors that determine the evolution of land use in small urban settlements on the north coast of Galicia, Spain. The study analyzed secondary data collected from land use maps between 1995 and 2003 using spatial metrics and logistic regressions on several variables affecting land use changes. It revealed, among other things, that the growth of commercial land uses is influenced exclusively by a well-communicated district and accessibility.

Asamoah (2010) put forward that commercial land use predominates among other land uses in Kumasi owing to the impact of urbanization. As a result, the Town and Country Planning Department has rezoned the City into a residential cum commercial zone.

3. Methods

This study employed a mixed-methods research design, targeting the owners and occupiers of properties in the selected areas and the practising estate firms in Akure, given their roles as property managers and their awareness of land use changes. Considering the small population size (200 or less), the study adopted a total census approach, in line with Israel (2002) recommendation that it is appropriate for small populations. Purposive sampling was utilized to encompass the entire target population.

A structured self-administered questionnaire was designed and employed to collected the necessary data for addressing the study objectives. The

collected data were subjected to analysis using discriminant function analysis, and the mathematical model is expressed as follows:

$D = b_o + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 \ldots\ldots + b_nx_n$ … Eqn 1

Where D = Discriminant score.

$b_0, b_1, b_2, b_3 \ldots b_5$ = Discriminant coefficients.

X_1 = neighbourhood characteristics

X_2 = accessibility.

X_3 = exploitation of property values

X_4 = inner City revitalization.

Table 1: Operationalization of Variables for the Discriminant Function Analysis.

Definition of Variables	Code	Measurement
Dependent Variable	Usechge	1 (Yes), 0 (No)
Land Use Changes		
Independent Variable		
Neighborhood Characteristics	Neigh	1 (important), 0 (less important)
Accessibility to property	Access	1 (easily accessible), 0 (Otherwise)
Exploitation of Property Values	Pptyval	1 (High property value), 0 (Otherwise)
Inner City Revitalization	Cityrev	1 (important), 0 (less important)
Urban Transformation	Urbntrs	1 (Significant), 0 (otherwise)
Governments Policy	Gvtplcy	1 (favorable), 0 (not favorable)
Availability of Market	Markt	1 (Available), 0 (Not Available)
Profit Maximization	Prft	1 (Higher Profit), 0 (Otherwise)
Highest and Best Use	Use	1 (High), 0 (Otherwise)
Obsolescence of Building	Build	1 (Good Condition), 0 (Otherwise)
Investment Potentials	Ivstmnt	1 (High), 0 (Otherwise)
Availability of infrastructure / Utilities	Infrast	1 (Available), 0 (Not Available)
Agglomeration of business activities	Business	1 (favourable), 0 (not favourable)
Planning Regulations	Planreg	1 (Available), 0 (Not Available)
Ease of property management	Pptymgt	1 (Easy), 0 (Otherwise)
Population of occupants	Poplatn	1 (High), 0 (Otherwise)
Prevalent land use	Landuse	1(Commercial), 0 (Otherwise)
Security and Safety	Security	1 (Available), 0 (Not Available)

Source: *Author's Compilation, 2023.*

4. Result and Discussion

Data collected for the study were primary data from the owners /occupiers of properties in the selected areas, the practicing Estate Surveying and Valuation firms in Akure because they are managers of the properties and are aware of land use changes.

4.1 Analysis and Presentation of Results.

4.1.1 Questionnaire Distribution.

During the research, data collected for the study were through questionnaires administered to the target population that comprised owners /occupants of properties in the selected areas and practicing Estate Surveying and Valuation firms in Akure. The results were analyzed and presented in Table 2.

Table 2: Number of Questionnaires Administered and Retrieved

Respondents	Area	Number distributed	Number Retrieved	Percent
Owners/ Occupants	Oba-Adesida Road	102	91	89.21
	Arakale Road	118	104	88.14
Estate Surveying and Valuation firms in Akure.		25	22	88.0
Total		*245*	*217*	*88.57*

Source: *Field Survey, 2023*

Table 2 shows that 102 and 118 questionnaires were distributed to the owners /occupants of properties in the selected areas of Akure consisting of Oba-Adesida Road and Arakale Road, respectively. Copies of the questionnaire retrieved were 91(89.21%) for Oba-Adesida Road and 104 (88.14%) for Arakale Road. Twenty-two (22) copies of the questionnaire out of the twenty-five (25) copies administered to the practising Estate Surveying and Valuation firms in Akure were also retrieved, representing 88.0%. Generally, 217 (88.57%) out of the 245 total administered questionnaires on the target populations were retrieved. This suggests a high response percentage, thus giving sound footing for further analysis.

Table 3: Factors Responsible for Choice of Arakale or Oba-Adesida Road

Factors Responsible For Choice of Arakale or Oba-Adesida Road	Oba-Adesida Road			Arakale Road		
	Mean	Std. Dev	Rank	Mean	Std. Dev	Rank
Proximity to the central market.	4.6484	.56517	2nd	4.4615	.50093	5th
Inheritance practice in the Area.	3.6154	1.15248	9th	2.1538	.86764	12th
Indigeneity of property owners.	3.2747	.63361	11th	2.2308	.80328	11th
Proximity to the police station.	2.3736	1.03975	14th	1.6923	.60863	14th
Proximity to the road.	4.5934	.57693	3rd	4.5385	.50093	4th
Condition of road.	3.3736	.64375	10th	3.0000	.88131	9th
Government Zoning policy.	4.2747	.74634	5th	4.6923	.46377	3rd
Access to regular electricity.	3.1099	.80898	12th	2.0000	.68266	13th
Nearness to place of residence.	4.4066	.69886	4th	4.2308	1.25590	8th
Financial power to pay for space.	4.0989	.78958	6th	4.3077	.91457	6th
Type of commercial property, i.e., modern or old building.	3.6374	.90082	8th	4.3077	.60863	6th
Condition of commercial property.	3.8022	.76332	7th	4.7115	.70605	2nd
Profit maximization potential.	4.8571	.35187	1st	4.8462	.36255	1st
Availability of waste disposal system.	2.6374	.92516	13th	2.8462	.77296	10th

Source: *Field survey, 2023.*

The results in Table 3 analyze the respondent's opinions on the factors responsible for choosing their respective areas. The results have been presented and ranked for better meaning and interpretation of the research. The study revealed, as shown in the table above that the significant factors influencing the choice of the selected areas are majorly related to profit maximization potential, which was ranked first by the areas with mean scores of 4.8571 and 4.8472, respectively. The occupants along Oba-Adesida Road further considered factors such as proximity to the market (4.6484), proximity to the road (4.5934), nearness to place of residence (4.4066) and government zoning policy (4.2747) which was ranked 2nd, 3rd, 4th and 5th respectively. The occupants along Arakale Road, on the other hand, opined the condition of the commercial property (4.7115), government zoning policy (4.6923), proximity to the road (4.5385) and proximity to the central market (4.4615), which were ranked 2nd, 3rd, 4th and 5th respectively.

4.1.2 Discriminant Function Analysis.

The identified factors responsible for land use changes were subjected to Discriminant function analysis to discern the factors and group them in order of priority as they influence land use changes.

Table 4: Case Processing Summary of Discriminant Function Analysis

Unweighted Cases		N	Percent
Valid		195	100.0
Excluded	Missing or out-of-range group codes	0	.0
	At least one missing discriminating variable	0	.0
	Both missing or out-of-range group codes and at least one missing discriminating variable	0	.0
	Total	0	.0
Total		*195*	*100.0*

Source: *Field Survey, 2023*

Table 4 shows that 100.0% of the distributed questionnaires were valid enough for the Discriminant analysis. Therefore, the entire 195 cases were used for the study.

Table 5: Eigen Values of Discriminant Function Analysis

Function	Eigenvalue	% of Variance	Cumulative %	Canonical Correlation (R)	$(R)^2$ %
1	2.353[a]	100.0	100.0	.838	70.22

a. First, one canonical Discriminant function was used in the analysis.
Source: *Field survey, 2023*

Table 5 of Eigenvalues provides information on each of the Discriminant functions produced and the efficacy of the Discriminant function. The maximum number of Discriminant functions produced is the number of groups minus 1. Two groups were used based on the locations examined (Oba-Adesida Road and Arakale Road), and one function was displayed. The canonical correlation is the multiple correlations between the predictors and the Discriminant function. It is interpreted as being the proportion of Variance explained (R^2). The canonical correlation of 0.838 for Function 1 suggests the model explains 70.22% of the variation in the grouping variable, whether the owner/occupants of Oba-Adesida Road and Arakale Road give the land use change opinion.

Table 6: Wilks' Lambda of Discriminant Function Analysis

Test of Function(s)	Wilks' Lambda	Chi-square	Df	Sig.
1	.298	222.639	18	.000

Source: *Field Survey, 2023*

Wilks' Lambda indicates the significance of the Discriminant functions and provides the proportion of total variability not explained. It is the converse of the squared canonical correlation shown in the preceding table. The smaller the Lambda for an independent variable, the more that variable contributes to the Discriminant function. Lambda varies from 0 to 1, with 0 meaning group means differ (thus the more the variable differentiates the groups), and one meaning all group means are the same.

The canonical correlation and the smaller value of Wilks' Lambda in Table 6 indicated a more significant discriminatory ability of the function. In addition, the chi-square statistic value showed that the Discriminant functions better at separating the two groups of respondents: owners/occupants of selected properties along Oba-Adesida Road and Arakale Road. In Table 5, function 1 indicates a significant function ($p<.000$) and provides the proportion of total variability not explained, i.e., the converse of the squared canonical correlation gives 29.8%. Hence, since $p<.05$, it can be concluded that the model is a good fit for the data.

The standardized canonical Discriminant function coefficients in Table 7 provide an index of the importance of each predictor like the standardized regression coefficients (beta) did in multiple regression. The sign indicates the direction of the relationship, whether positive or negative. The variables with the more significant coefficients stand out as those that strongly predict allocation to the group.

Table 7: Standardized Canonical Discriminant Function Coefficients of Discriminant Function Analysis.

	Function
	1
Neighbourhood Characteristics	.408
Accessibility	.282
Exploitation of Property Values	.634
Inner City Revitalization	.096
Urban Transformation	-.254
Governments Policy	-.630
Availability of Market	-.351
Profit Maximization	.281
Highest and Best Use	-.575
Obsolescence of Building	.061
Investment Potentials	.396
Availability of infrastructure / Utilities	-.355
Agglomeration of business activities	-.082
Planning Regulations	-.253
Ease of property management	.195

Population of occupants	.419
Prevalent land use	.498
Security and Safety	.200

Source: *Field Survey, 2023*

Table 7 revealed that in Function 1, exploitation of property value (0.634) was the strongest predictor of land use changes, followed by government policy (-0.630) and highest and best use (-0.575). This means that they were the most successful predictors of land use changes along Oba-Adesida Road and Arakale Roads.

Table 8: Tests of Equality of Group Means of Discriminant Function Analysis

	Wilks' Lambda	F	df1	df2	Sig.
Neighborhood Characteristics	.958	8.497	1	193	.004
Accessibility	.916	17.801	1	193	.000
Exploitation of Property Values	.785	52.792	1	193	.000
Inner City Revitalization	.920	16.858	1	193	.000
Urban Transformation	.944	11.359	1	193	.001
Governments Policy	.854	33.076	1	193	.000
Availability of Market	.906	19.985	1	193	.000
Profit Maximization	.958	8.497	1	193	.004
Highest and Best Use	.947	10.701	1	193	.001
Obsolescence of Building	.972	5.572	1	193	.019
Investment Potentials	.895	22.720	1	193	.000
Availability of infrastructure / Utilities	.897	22.187	1	193	.000
Agglomeration of business activities	.960	7.994	1	193	.005
Planning Regulations	.934	13.600	1	193	.000
Ease of property management	.940	12.272	1	193	.001
Population of occupants	.924	15.789	1	193	.000
Prevalent land use	.937	13.070	1	193	.000
Security and Safety	.781	54.040	1	193	.000

Source: *Field survey, 2023*

Table 8 provides an insight into the relative contribution of each variable. All the variables were significant from the table at a p-value of 0.000 ($p<0.05$). Wilk's lambda function indicated that security and safety best discriminate between the groups, followed by exploiting property values. This also agrees with the ranking by the structure matrix in Table 9.

Table 8 also provides the relative importance of the predictors. It shows the correlations of each variable with the Discriminant function. These Discriminant loadings serve as factor loadings in factor analysis. Identifying the most significant loadings for each Discriminant function gives an insight into how to name each function.

Table 9: Structure Matrix of Discriminant Function Analysis

	Function
	1
Security and Safety	.345
Exploitation of Property Values	.341
Governments Policy	-.270
Investment Potentials	.224
Availability of infrastructure / Utilities	-.221
Availability of Market	.210
Accessibility	.198
Inner City Revitalization	.193
Population of occupants	.186
Planning Regulations	-.173
Prevalent land use	.170
Ease of property management	.164
Urban Transformation	.158
Highest and Best Use	-.153
Neighborhood Characteristics	.137
Profit Maximization	.137
Agglomeration of business activities	.133
Obsolescence of Building	.111

We pooled within-group correlations between discriminating variables and standardized canonical Discriminant functions. The absolute size of correlation within function orders variables.

Source: *Field survey, 2023.*

Structure matrix correlations are mainly employed because they are more accurate than the Standardized Canonical Discriminant Function Coefficients. The structure matrix shows the correlations of each variable with each Discriminant function. The researcher gains insight into naming each function by identifying the most significant loadings for each Discriminant function. Here, security and safety, exploitation of property values, government policy, investment potentials, availability of infrastructure/utilities, and availability of market suggest the factors influencing land use changes as the function that discriminates between land use changes in the two selected areas.
The Canonical Discriminant Function Coefficient in Table 9 shows the unstandardized coefficients (b) used to create the discriminant function (equation). It operates just like a regression equation.

Table 10: Canonical Discriminant Function Coefficients of Discriminant Function Analysis

	Function
	1
Neighborhood Characteristics	1.082
Accessibility	.782
Exploitation of Property Values	1.450
Inner City Revitalization	.225
Urban Transformation	-.693
Governments Policy	-1.424
Availability of Market	-.752
Profit Maximization	.744
Highest and Best Use	-1.385
Obsolescence of Building	.138
Investment Potentials	.968
Availability of infrastructure / Utilities	-.824
Agglomeration of business activities	-.232
Planning Regulations	-.794
Ease of property management	.801
Population of occupants	.884
Prevalent land use	1.280
Security and Safety	.488
(Constant)	-2.138

Unstandardized coefficients
Source: *Field Survey, 2023*

The canonical Discriminant function coefficient table contains unstandardized coefficients (*b*), which are used to create the equation. The Discriminant function coefficient *b* indicates the partial contribution of each variable to the Discriminant function controlling for all other variables in the equation. They can be used to assess each independent variable's unique contribution to the Discriminant function and provide information on each variable's relative importance.

From Table 8, the Discriminant equations can be created as:
Factors influencing Land use changes = f (Neigh + Access + approval + Cityrev + urbntrs + gvtplcy + markt + prft + use + build + ivstmnt +infrast + business + planreg + pptymgt + poplatn + landuse +securty + constant) -------- (vii)
Factors influencing Land use changes = (1.082 x neighbourhood characteristics) + (0.782 x Accessibility) + (1.450 x exploitation of property values) + (0.225 x inner City revolution) - (0.693 x urban transformation) - (1.424 x government policy) - (0.752 x availability of market) + (0.744 x profit maximization) – (1.385 x Highest and best use) + (0.138 x obsolescence of building) + (0.968 x investment potentials) – (0.824 x availability of infrastructure/utilities) – (0.232 x agglomeration of business activities) – (0.794 x planning regulations) + (0.801 x ease of property management) + (0.884 x population of occupants) + (1.280 x prevalent land use) + (0.488 x security and safety) – 2.138 ----- (viii)

5. Conclusion

The study assessed land use changes in Akure City core to maximize urban land use potentials. Land use change no doubt exists at the City core, as revealed in the research. Akure's existing land use types have changed dramatically from 1993 to 2023 from their original size and coverage. The analysis showed that 1993 residential land use dominated Akure City core until 2003. Significantly, between 2010 and 2023, commercial land uses had a relatively steady increase compared to the decades before. The dominant land use change is commercial land use, which has penetrated and invaded the traditional setting of the City core by displacing its preceding predominant residential land use - land use succession is underway.

It was also established that most land use changes from residential to commercial land uses are driven by profit maximization potentials, proximity to market, proximity to the road, nearness to place of residence, government zoning policy, and commercial property condition. The study showed that land use changes are inevitable in the Akure City core area, but these changes within are strictly regulated.

6. Recommendations.

Based on the above findings, the following recommendations are put forward:

- Land use changes as part of determinants of property values must be examined and understood by Estate Surveyors and Valuers in determining property values.
- No doubt, the investment potentials of the Core area are enormous; the Government could tap into this and increase its Internally Generated Revenue.
- The Ministry, saddled with planning, should leverage the findings of this study and plan to control and accommodate the growth of the City core.
- The State's Planning agency could also regulate the pattern of land use changes within the Core area.

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