

Analyses of Spatio-Temporal Land Use Conversion and Implication in Akure, Nigeria.

***¹Michael Oloyede Alabi & Ayoyimika Esther Agi**

Department of Urban and Regional Planning,
The Federal University of Technology, PMB 704
Akure, Nigeria.

E-mail: moalabi@futa.edu.ng, Ayoyinka08@gmail.com

Abstract

Land use conversion is an emergent challenge to urban planners globally, particularly in developing countries such as Nigeria. Most land and residential buildings in Akure have continually experiencing conversion from the initial purpose of acquisition to evolving usages. The study aimed to identify the peculiar factors affecting land-use conversion and the strength of these factors in Akure core in the past 37 years (1984-2021). A total number of 123 pieces of the questionnaire were distributed for the study. The study investigated the pattern and factors of land use conversion. The pattern of land use conversion was analysed using GIS, while the factors of conversion were determined using the Factor Analysis statistical technique. Findings revealed that most respondents did not acquire their lands from the government but from distressed owners who inherited the properties, hence converting their lands without adhering to the approval procedure for formal planning permission. It was also revealed that the city core has significantly converted from residential to commercial use. Land scarcity accounted for 15.8% of the total variance in conversion, leading to traffic congestion issues, amongst others. It is recommended that regulatory authorities and planners utilise urban planning measures to ensure that lands are used for the allocated purposes, and penalties are meted out on contraventions.

Keywords: Land use, Urban growth, land use conversion, factor analysis

Introduction

Land is a significant factor of production and a vital element in the socio-economic development of a city. It is said to be the physical manifestation of socio-economic, cultural, political and environmental forces shaping land use in an urban area (FAO, 2003; Akinmoladum & Oduwaye, 2017). However, the supply, procurement, tenure and use remained pertinent in the wish of man to create a liveable city. Hence, physical development continually undergoes building and rebuilding activities and conversion of use of buildings, especially in old areas of the towns like the core in developing countries. Building use conversion is the change in the use of a building from the purpose for which it was originally used or intended (Ogungbemi, 2012). The increase in land demand for built-up at the city cores has resulted in a corresponding decrease in supply at the detriment of other land-use types at the city centre. According to Aliyu and Adamu (2017), city centres are often

referred to as economic and commercial hubs. Thus, there is an increased demand for commercial activities and, by implication, commercial land uses.

Residential building conversion in Nigeria has continued to negatively impact the housing stock in the cities as the percentage of buildings initially used for residential purposes declined from 71 per cent in 1999 to about 39 per cent in 2020 (Uroko, 2020). The conversions, mostly contravening planning laws, are changing residential buildings to commercial use. Most residential buildings at the city core have now been converted for use as shops, stores, restaurants, tailoring workshops and small-scale industries. In most streets, the frontal rooms of buildings are converted, and, in some cases, extensions are made crossing setback boundaries, converting valuable residential spaces to commercial use (Ankeli et al., 2019). These consequentially reduced residential housing stock in cities, leading to increased occupancy ratio and population density, exacerbating slum

development and homelessness. Slums and illegal developments are emerging hotspots for coronavirus (COVID-19) transmission. Even though the Nigerian government at the federal and state levels joined the rest of the world to proclaim restrictions and total lockdown as the case may control the community spread of the novel infectious coronavirus disease, such as social distancing, which has become "the new normal." The measures above might not be very effective due to the heightened risk of COVID-19 due to overcrowding and congestion in houses.

Akure, like other cities in Nigeria, is also experiencing a renewal in the form of vertical and horizontal development where some residential buildings are being converted for uses such as offices, hotels, religious activities, recreational centres, commercial activities and other uses as well the conversion of open spaces to built-ups. These conversions result in consequences that bring about imbalance in the urban setting and environmental issues. The situation calls for investigation into patterns and the determinants of these trends, hence the need for a study examining the peculiarities of the factors affecting land-use conversion. Therefore, this study aims to find the peculiar factors affecting land-use conversion and the strength of these factors in the city core. This will be carried out through the objectives: to examine the pattern of land-use conversion in the core of Akure from 1984 – 2021 and to find the factors of land-use conversion in the core of Akure.

Theoretical Framework

From a theoretical perspective, there is a clear difference between conversions emanating from a direct emphasis on land use and those whose initial consideration is the land user. Many models focus mainly on land use by simulating its state at a particular location. In contrast, other approaches take land users as the starting point and try to understand their behaviour. The narrative of the spatial decisions of individuals or groups is then used to infer land-use conversion. Approaches to determine land use conversion may be either deterministic or probabilistic. The former applies strict cause-effect relations, while conversely, the latter considers the probability of land-use conversion occurrence. The essence of this second approach is introducing an element of uncertainty. A type of use is attached to a

location based on an estimated probability rather than following a straightforward deductive approach. This paper focuses on the deterministic approach based on conversion factors hinged on economic theories, as confirmed in Egbenta (2009). The identified conversion factors utilised were obtained from previous literature on land use conversion (Verburg *et al.*, 2004; Ogungbemi, 2012; Purwanto *et al.*, 2017).

Literature Review

The early and well-known theories of land use and conversion in literature are those of Ricardo and, in a more spatial context. Von Thünen established the foundation for land price and land-use theories that are still relevant today. In Kruijt *et al.* (1990), Ricardo (1817) explained land prices in terms of differences in soil fertility levels and in terms of land quality. They explained that better quality land is more profitable than lesser quality land, resulting in a higher price. Von Thünen (1826) later concentrated on the role of distance and, thus, transportation costs in explaining land-use patterns and land prices. Households weigh up land prices, transportation costs and the amount of land needed. This leads to a simple model with decreasing land prices as one moves away from the city centre. The land use resulting from these assertions is that of an archetypal monocentric city. Commercial land use is concentrated in the city centre (central business district); industrial and housing functions will have less money available for a central location and will select a location at a greater distance from the centre; the edge of the city is identified where the offer of the urban bidders is equal to that of the agrarian bidders. The discrete choice theory is another important concept related to economic theories that explain land-use patterns and conversion (McFadden, 1978).

In Nigeria, an increase in urban population has exacerbated the enormity of the housing problems and the need for commercial space, hence land use conversions (Oyesiku, 2009). Falade (2011) and Abiodun *et al.* (2011) observed that the degree of land use conversions varies with the time under consideration and the geographical locations. This was supported by Gbadamosi and Ibrahim (2013), who noted that the city core tends to experience incursion of commercial and other series of business and trading activities, often in conflict with government-approved land use plans. At the same time, Olaitan (2016)

adduced the pattern of the city cores being spiked with haphazard property conversions characterised by complex interlinks of residential, commercial, and mixed development. Also, Oduwaye (2013) and Fawehinmi (2016) professed that property conversion is vitally influenced by profit maximisation in the Akure city core. Ankeli (2007) asserted that investors' expected returns on the available use options, along with financial and social factors, determine land use conversions. Ogungbemi (2012) argued about the factors that influence change in usage and the associated problems. He further posited that land use conversion is prompted by economic, demographic, institutional, infrastructural, environmental attributes, and sociological factors (Raji, 2008; Purwanto et al., 2017).

Study Area

Akure is a traditional Nigerian city in the South-Western part of Nigeria. It lies approximately on latitude 70, 15' North of the Equator, and longitude 50, 15' East of the Greenwich Meridian (Macmillan, 2006). Akure is a medium-sized urban centre that became the provincial headquarters of Ondo province in 1939. It became the capital city of Ondo State and Akure Local Government Council Headquarters in 1976. The city's population grew from 38 852 in 1952 to 71,106 in 1963. Its population was estimated to be 112,850 in 1980 and 157,947 in 1990 (Ondo State of Nigeria, 1990). The 1991 National Population Census put the population of Akure at 239,124, while its estimate for 1996 was 269,207 (NPC, 2007). It had a population of 484,789 as of the 2006 population census and was estimated to be 756,386 in 2021, with a density of 490/sq km (1,300/sq mi). Consequently, the city had a heterogeneous mass of people and activities. The city's morphology has gradually been altered to assume its present status with its attendant housing problems. Akure is approximately 420 kilometres South West of Abuja, the Federal Capital of Nigeria and about 350 kilometres to Lagos (Figure 1).

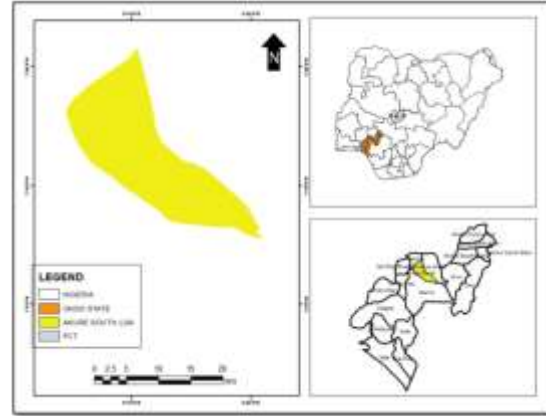


Figure 1: Akure in the context of Ondo State, Nigeria

Methodology

The study adopted primary and secondary data acquired through a questionnaire survey and archival data (from the Ondo State Ministry of Lands and Survey). The sampling frame includes all the buildings in the Akure Core from which respondents were selected randomly within the 12 strata of which the Akure Core was segmented (i.e., Araromi, Cathedral, Erekesan, Eruoba, Ijomu, Imuagun, Isolo, Obanla, Odo-Ijoka, Odo-Ikoyi, Stadium). The study area has been clustered at the city centre but delineated into segments using street boundaries. The northern part includes the Carr Street and Araromi area; the western part includes the stadium and cathedral areas; the central core includes the Ijomu and Obanla areas, where we have the Oja-Oba market and Arakale market. The area was delineated to help in enriching the collection and computation of the territorial statistics.

The sampling size was derived for 123 building blocks; therefore, 123 pieces of the questionnaire were distributed proportionally to the number of buildings in each stratum. The first house was randomly picked before systematically administering the question at an interval of 10 until the required sample was obtained for all the building blocks in the study area. All questionnaire copies were returned, amounting to a 100% response rate. Using 1984 as the base year, the core area was classified into commercial and residential mixed-used, after which the changing trend for 37 years was assessed (i.e., 1984-2021). This was informed by the date of the first prepared Master Plan (1984). Maps were generated to show land use

patterns for each period under consideration in a GIS environment and updated through ground truthing to achieve objective one. The factor analysis was used to find the factors influencing land use conversion in the area and the strength of these factors to achieve objective two.

Sample Size

A total of 321 buildings were counted. Thus, the sample size was obtained through the use the of Cochran sampling method; using the formula, $(Z\text{-score})^2 * p(1-p)$ (margin of error)², Where $Z = Z_{\text{value}}$ at 1.96 ; P = population proportion at 20%; Margin error at 2%.Therefore;

$$\frac{(1.96)^2 * 0.2 (0.8)}{0.998} = 1.07$$

Using the F-score table, 1.07 is converted to the sample size of 123 buildings.

Factor analysis

Factor analysis technique was used to find the determining factors of conversion of land uses in the study area. The following factors were considered: family problems, scarcity of land, land cost, accessibility, the economy of scale, mobility, the proximity to the road, access to similar trade, property maintenance value, property maintenance value, lack of finance, demand for shops, physical expansion of the city, government urban renewal, availability of electricity, crisis on whom to maintain the property.

The formula was applied thus:

$$F = W1 \text{fap} + W2 \text{slic} + W3 \text{nedep} + W4 \text{sol} + W5 \text{colc} + W6 \text{cica} + W7 \text{ecosca} + W8 \text{moby} + W9 \text{proxiro} + W10 \text{usatrad} + W11 \text{pomav} + W12 \text{lofre} + W13 \text{defos} + W14 \text{pec} + W15 \text{gurre} + W16 \text{aveo} + W16 \text{comp}$$

Where:

F = Determinants of land use conversion; fap = Family problems; slic = Scarcity of Land nedep = New developer’s pressure; sol = Size of the land; colc = Cost of land; cica = City centre accessibility; ecosca = Economy of scale; moby = Mobility; proxiro = proximity to road usatrad= access to similar trade; pomav = property maintenance value; lofre = lack of financial resources; defos = demands for shops; pec = physical expansion of city; gurre =

government urban renewal; aveo = availability of electricity; comp = crisis on who to maintain property

Results and Discussion

The Pattern of Land Use Conversion in the Study

Table 1 shows the mode of Conversion from 1984-2021. However, 1984-2021 was broken down into three epochs. The mode of conversion from 1984 to 1994 indicates that, at Araromi, 17.1 % of the buildings were residential, 9.9% were mixed-use, and only 3.7% were used for fully commercial purposes. A similar trend was observed in the cathedral area down to the stadium neighbourhood. The residential use remained at 17 %, and the mixed-use and commercial land use followed a similar trend.

Table 1: Mode of Conversion from 1984-2021
Source: Ministry of Physical Planning and Urban Development, Akure, 2021.

Area	Residential use			Mixed-use			Commercial use		
	1984-1994 NO (%)	2004-2014 NO (%)	2014-2021 NO (%)	1984-1994 NO (%)	2004-2014 NO (%)	2014-2021 NO (%)	1984-1994 NO (%)	2004-2014 NO (%)	2014-2021 NO (%)
Araromi	10	7	83	13	11	13	2	7	4
Cathedral	13	2	6	11	16	14	1	7	5
Erekesan	0	0	0	3	9	3	22	23	22
Eruoba	15	5	10	10	9	12	0	5	3
Ijumu	18	5	7	7	9	13	0	10	5
Imuagun	15	4	8	10	16	15	0	5	3
Car street	13	3	7	8	9	11	4	12	7
Isolo	17	2	9	6	9	18	2	5	2
Obanla	18	4	15	6	9	16	1	5	2
Odojoka	15	6	12	8	9	10	2	41	6
Odoikoyi	12	6	8	11	9	14	2	5	15
Oja	17	2	5	6	9	18	2	5	2
Oshodi	17	2	5	6	9	18	2	5	2
Stadium	18	6	10	6	9	10	1	9	7

The period from 2004 to 2014 shows a rapid increase in building conversion, where many of the conversions were to mixed-uses. The Cathedral area recorded the highest conversion rate, increasing commercial use from 8% to 64%. The Imuagun area also recorded a high increase in conversion, about 28%. The Odo-Ijoka and Odo Ikoyi and Stadium areas also experience a similar trend with a 24% conversion of residential use to mixed-use. In comparison, Odo Ijoka has the highest conversion from mixed-use to commercial use at 60%. Oja Oshodi recorded the highest conversion from mixed-use to commercial use at 72%. While Erekesan did not experience significant residential land use change before 1984, when changes started with 8% of its residential buildings converted to mixed-use, commercial use dominated the area at 92%. The Carr Street area, which became a specialized commercial area for car spare parts, increased in commercial use to 48% (Figure 2).

From 2014 to 2021, there was an increase in buildings with commercial use within the core. The areas around Odo Ikoyi recorded a 60% increase in commercial activity in the Carr Street area; the Stadium area had an increase in conversion to commercial use at 28%. The Odo-Ijoka area, though, at the periphery of the core, had a conversion to commercial use at 16%. The Obanla, Isolo and Oja Oshodi area, also at the edge of the core, had an 8% conversion of its buildings to commercial use, with Imuagun and Odo Ijoka having 12% conversion. The Oja Oshodi and Isolo had 72% mixed-use, with Imuagun having 60% of its buildings changed for mixed-use. Also, the Araromi and Cathedral areas both have 56% of their buildings converted to mixed-uses. Erekesan is the least of the areas with converted buildings for mixed-use, with Obanla and Stadium area having 32% conversion each (Table 1, Figure 2).

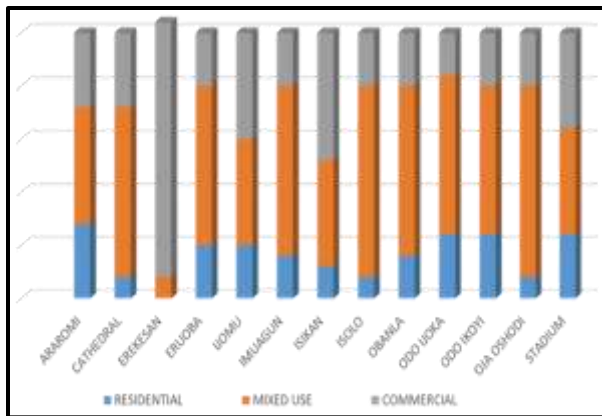


Figure 2: Mode of land use conversion from 2014 to 2021.



Figure 3: The pattern of land use from 1984-2021
Source: Author's, 2021

Figure 3 shows the pattern of change in use from 1984 to 2021. The period 1984 to 2004 shows high mixed-use blocks in the western area (Stadium and Cathedral area) and high residential use in the northern part (Carr Street and Araromi area) dotted with commercial use in the northeastern part of the area (Ijomu and Obanla area). Nevertheless, by 2004-2014, residential development had declined to 48.5% while mixed-use increased by 9.36% and commercial land use conversion increased by 32.04%; commercial land use is growing gradually within the core. From 2014 to 2021, only a few fully residential blocks remained unconverted, with more mixed-use at the northeastern part of the core. This is unsurprising since these areas are close to Oja Oba (the main market), like the Ijomu and Obanla areas. Also, the northwestern part of the area is another significant area of mixed-land use, whilst the residential use had been combined with commercial use due to its closeness to the Arakale market. As one moves southwards towards the market of Oja Oba and Arakale, buildings become fully for commercial purposes. During this period, there was no building blocks conversion to full residential use, 0%, while mixed land building block conversion was

5.52%, a reduction of 3.82%. While commercial land use conversion had an increase of 8.82%. (Figure 2; Figure 3). This implies that many buildings are for commercial use, reducing residential housing, hence housing scarcity. This agrees with Oduwaye's (2017) and Aliyu and Adamu's (2017) findings.

The Factors of Land Use Conversion

Table 2 is the Component matrix, an output of the factor analysis; it reveals the percentage variation and the strength and contribution of the factors to conversion.

Table 2 Component Matrix

1	Family problems	.842	-.033	.039	.015	-.178	.245	-.118
2	Scarcity of land in the core	.751	.202	-.153	-.125	.026	-.083	.098
3	New developers' pressure	.106	.462	-.004	.256	-.163	-.153	-.012
4	Size of the land	.739	-.031	-.084	.161	.143	-.250	.092
5	Cost of land	.153	.187	.041	-.408	-.564	.353	.272
6	City centre accessibility	.392	.120	-.452	-.161	-.093	-.154	.401
7	Economy of scale	-.052	.442	-.548	.072	.333	.176	.148
8	Mobility	-.248	-.029	-.164	.622	-.012	.398	.059
9	Access to good roads	.051	.062	.039	-.083	.841	.171	.055
10	access to similar trade	.144	.047	.064	.803	-.004	-.038	.087
11	Property maintenance value	-.211	.146	.715	-.150	.205	.193	.047
12	Lack of financial resources	-.056	.511	.188	-.056	.182	.157	-.454
13	Demands for shops	.061	.731	.008	-.149	.054	-.047	-.035
14	Urban Regeneration	-.047	-.101	.043	.079	.114	.842	-.064
15	Availability of electricity	-.012	.083	-.106	-.078	-.068	-.030	-.737
16	Crisis about who is to maintain property	.017	.083	.550	.130	-.115	-.148	.393
	Eigen value	2.54	1.69	1.54	1.27	1.23	1.12	1.05
	% Variance	15.886	10.542	9.639	7.922	7.676	7.024	6.585

Source: Author's, 2021.

Seven factors with eigenvalues larger than unity emerged from the oblique rotation analysis. The factors accounted for **53.36 %** of the total variation in conversions in the study area. The first component (factor) named **Land scarcity**, accounted for 15.8% of the total variance; the scarcity of land is more prevalent in Cathedral, Carr Street, Imuagun, Isolo, Ijomu, Eruoba, Erekesan, Obanla, Odo-Ijoka, Odo-Ikoyi, Oja-Oshodi and Stadium Areas of Akure with Araromi only being the exception. The component was found to relate to family problems, and the component is loaded positively high on 0.842, followed by the scarcity of land (0.751) and size of land (0.751) (Table 2).

The second component (factor) is access to **demand for commercial space**, accounting for 10.54% of the total variance. Places like Carr Street, Erekesan, Odo-Ijoka, Odo-Ikoyi, and Oja-Oshodi are the most affected by this component. The component is loaded

positively on new developers' pressure (0.662), followed by demands for shops (0.731) and a heavy negative loading on lack of financial resources (0.511) (Table 2).

The third component (factor), named **cost of property maintenance**, accounted for 9.64% of the total variance, with positive component loading of 0.715 on property maintenance value and 0.550 on whom to maintain the property, but with high negative loading on access to other businesses (-0.548). This is a common phenomenon in all of the core as property maintenance is very high and unattainable for people without a high-income level (Table 2).

The fourth component (factor), named **economy of scale**, accounted for 7.92% of the total variance, loading heavily positively on uses in adjoining areas (0.803), followed by transport availability at 0.622 but with heavy negative loadings on the cost of land at the core (-.408). For instance, at Carr-street where spare parts of vehicles are sold, small commercial activities like brake fluid and power steering lubricants complement the spare part trader in the market (Table 2).

The fifth component (factor) named, **transportation accessibility**, accounted for 7.68% of the total variance, with the component loading heavily positively on access to roads at 0.841, followed by access to other businesses at 0.333 but with heavy negative loadings on the cost of land at the core (0.564). This impact is majorly felt in areas like Cathedral, Carr Street, Isolo, Ijomu, Eruoba, Erekesan and Odo-Ikoyi (Table 2).

The sixth component (factor), named **Urban regeneration**, accounted for 7.02% of the total variance, with the component loading heavily positively on the private efforts of investors on urban regeneration at 0.841 followed by transport availability at 0.398 and cost of land at the core (0.353). The idea of an urban renewal project from the government is imbibed by every building owner in the core, particularly the ones on the city's major roads. Areas like Cathedral, Ijomu and Erekesan. (Table 2).

The seventh component (factor), titled **accessibility to the city centre**, accounted for 6.57 % of the total variance, with the component loading accessibility to the city centre at 0.401. This was followed by negative

loadings on lack of financial resources (-0.0454) and availability of electricity (-0.737). Eruoba dominates the city centre, and all city activities end there (Table 2).

Implications

The quest for converting land to commercial use has led to the present pattern of development of discombobulation with distortions and a consequence of illegal developments and not adhering to the approved master plan. Violation of planning regulations had been recorded, where buildings, in order to acquire more space for shops, encroach on road setbacks and the right of way. Shopping malls were found to be built without consideration for parking space. Hence, people park cars on the roads, causing traffic gridlocks and generating traffic congestion. Occupancy ratios have increased due to the scarcity of residential buildings, which became a source of concern during the COVID-19 pandemic. Some residential apartments have been converted into business premises. Shop owners among the respondents agreed with the idea of disposing of their waste indiscriminately. Some admitted that they do deposit waste behind their shops. In contrast, others agreed they collect them and wait for the rain to fall so they can dump the waste into water drainage to be flushed away by rainwater, leading to drainage blockage and flooding (Figure 3).

The result of the factor analysis showed that the most potent factor of conversion is land scarcity. Land as a primary production tool will, therefore, continue to be in shortfall and, by implication, scarcity of housing stock and the high cost of housing. Developers quickly worked on land owners to convert land use from residential to other uses, especially commercial ones. The need for space has led to the conversion of building façades into shops and shop extensions. At the same time, the inner rooms are used for residential purposes, and, in some cases, the inner rooms are used as warehouses. Property cost maintenance was found to be another factor for building conversion at the city core. This occurs when the initial property owners cannot maintain their properties; they may opt to sell their properties and allow new owners to take it up and, in turn, convert the building to commercial use. The economy of scale is another factor that determines land use conversion. Since the city's economy depends

on the core, people converge regularly for economic activities. Therefore, the need arises for more space for business activity. Hence, the conversion of buildings from residential to wholesome commercial buildings. Another factor determining land use conversion is transport accessibility at the core. This area has good roads and high connectivity that enhance the movement of people, goods and services to attract commercial activities. It attracts commercial use; hence the competition to be near these areas. So, developers prefer to spend money to buy existing buildings and convert them for commercial purposes because of their easy accessibility to goods and services.

Conclusion

The preceding discussion has shown that the main reasons for use conversion are mainly to maximise profits for the user and the developer. The land owner converts residential use to commercial to make more money. At the same time, the user takes up commercial activities at the core for easy accessibility and the tendency to stay close to the market due to the cost of doing business and economy of scale. However, these activities are carried out without adequately recusing existing land use regulations. Improving housing conditions in the city core depends on land use management; therefore, to protect residential land uses and ensure a more functional and balanced physical development in the city, the master plan should be provided, which will determine the use of land in various segments of the city. There should be dutiful enforcement of state building regulations by the development control arm of the state's Ministry of Physical Planning and Urban Development. It is recommended that regulatory authorities and planners develop urban planning measures to ensure that lands are allocated for the purposes set on the master plan and penalties are meted out on contraventions.

References

- Akinmoladun, O. I. and Oduwaye, L. (2017). Planning laws and policies influencing the use of land in metropolitan Lagos, Nigeria. *FUTY Journal of the Environment*, 2(1), 88-99.

- Abiodun, O.E., Olaleye, J.B., Dokai, A.N. and Odunaiya, A.K. (2011). Land use change analysis in Lagos State, Nigeria from 1984-2005. FIG Working week 2011, Bridging the Gap between cultures Marrakech, Morocco, 18-22 May 2011, TS09C-Spatial information processing II, 5142.
- Aliyu, A. and Adamu, L. (2017). Urbanization, Cities, and Health: The Challenges to Nigeria – A Review. *Annals of African Medicine*, 16(4), 149-158.
- Ankeli, I. A., Nuhu, M. B., Sule, A. I., Ankeli, U. C., & Alade, A. F. (2019). Land Use Conversions and Rental Value Regime in an Emerging City. The Awareness, Attention and Action. In *Proceedings of 74th Research for an International Conference, Hamburg, Germany, 4th-5th December*.
- Ajanlekoko, J. O. (2011). *Construction Development Bank: A panacea for affordable housing and infrastructural development in Nigeria*. A paper Delivered at the 4th Annual Lecture of the School of Environmental Technology, Federal University of Technology, Akure, Ondo State. 5th December
- Bradley, T., Mansouri, M.A., Kee, F & Garcia, L.M.T (2020). A systems approach to preventing and responding to COVID-19. *EClinicalMedicine*, 21(2020), 100325.
- Egbenta, I. (2009). Analysis of residential land use change in Enugu. *Journal of Environmental Management and Safety (JEMS)*, vol. 1 no. 1, pg 110–123.
- FAO (2003). Overview of Land Value Conditions. AGL/MISC/35/2003.
- Fawehinmi, A. (2002). Property Conversion in Nigeria: A Case Study of Conversion in Akure. *The Lagos Journal of Environmental Studies*; 4 (1): 52-60.
- Falade, J.B. (2011). Urbanization and Physical Planning in Nigeria. Being paper presented at International Conference on fifty years of urbanization in Nigeria, organized by the foundation for development and environmental initiatives (FDI), held at Ikeja Airport. Hotel, 22 October 2011.
- Gbadamosi, K., and Ibrahim, S. A. (2013). Land Use Conversion and Traffic Situation in Lagos, Nigeria: An Impact Assessment of Victoria Island. 13th World Conference on Transport Research (WCTR). Rio de Janeiro, Brazil, July 15-18.
- Kruijt, B., Needham, B. and Spit, T. (1990) *Economischegrondslagen van grondbeleid Stichtingvoorbeleggings- envastgoedkunde*, Universiteit van Amsterdam.
- National Population Commission [Nigeria]. (2006). *National Population Census*. Abuja: National Population Commission.
- National Population Commission. 2007. Census 2006. North is 75 million; South is 64 million. The Nation., 1(0164): 1-2.
- McFadden, D.L. (1978). Modelling the choice of residential location in Karlsqvist, A., Lundqvist, L., Snickars, F. and Weibull, J.W. (eds) *Spatial Interaction Theory and Planning Models*, North-Holland, Amsterdam, pp. 75–96.
- Oyesiku, O.K. (2009). "City livability: Implications and challenges "Lead paper presented at the Commonwealth Association of Planners, west Africa workshop. Lagos. Nov.2009.
- Ouedraogo, I., Tigabu, M., Savadogo, P., Compaore, H., Oden, P.C. & Ouadba, J. M (2010). Land cover change and its relation with population dynamics in Burkina Faso, West Africa. *Land Degradation and Development*, 21, 453- 462
- Ogungbemi, O. A. (2012). Factors Influencing Change of Use and Its Attendant Problems: Case Study of Yaya Abatan Ogba, Lagos State. *Journal of Emerging Trends in Economics and Management Sciences (JETEMS)*; 3 (6): 901-906
- Oduwaye, L. (2013). Urban Planning Implications of Changing Land Use Structure of Metropolitan Lagos, Nigeria. In Schrenk, M., Popovich, V. V., Zeile, P., & Elisei, P. *Proceedings Real Corp, Tagungsband*, 20-23 May, Rome, Italy.
- Olaitan, O. S. (2016). Spatio - Environmental Dimension of Residential Landuse Change along Taiwo Road, Ilorin, Nigeria. *Global Journal of Human-Social Science (Geography, Geo-Sciences, Environmental Science & Disaster Management)*; 16 (6): 59-68.
- Purwanto, A. N., Ernawati, J., & Wijaksono, A. D. (2017). The Factors of Land Use Conversion

- from Settlement Area to Commercial Area at IR. Soekarno/ Merr Street, Rungkut Street, and Medokan Ayu Street, Surabaya. *International Journal of Environmental & Agriculture Research (IJOEAR)*, 3(4), 86-93.
- Raji, O. (2008). Public and private developers as agents in urban housing delivery in Sub-Saharan Africa: The Situation in Lagos State. *Humanity of Social Sciences Journal*, 3 (2), 143–150.
- Taylor, L. (2018). Housing and Health: An Overview of the Literature. Health Affairs Health Policy Brief, June 7, 2018.
- Turner II, B. L., Clark, W. C., Kates, R. W., Richards, J. F., Mathews, J. T., and Meyer, W. B. (1990). *The Earth as Transformed by Human Action: Global and Regional Changes in the Biosphere Over the Past 300 Years*. UK: Cambridge University Press.
- Uroko, C (2020). Slum dwellers worst hit as COVID-19 exposes 'homelessness' in Nigeria, journal conversation, Academic rigour, journalistic flair, Africa republish@theconversation.com
- Verburg, P. H., Van Eck, J. R. R., de Nijs, T. C., Dijst, M. J., & Schot, P. (2004). Determinants of land-use change patterns in the Netherlands. *Environment and Planning B: Planning and Design*, 31(1), 125-150.
- Von Thünen, J.H. (1826) *Der isolierte Staat, in Beziehung auf Landwirtschaft und Nationalökonomie*, Neudruck nach der Ausgabe letzter Hand (1842) Gustav Fisher Verlag, Stuttgart, 1966.
- Wingo Jr, L. (1961, December). An economic model of the utilization of urban land for residential purposes. In *Papers of the Regional Science Association* (Vol. 7, No. 1, pp. 191-205). Berlin/Heidelberg: Springer-Verlag.