

Spatio-Environmental Dimension of Residential Landuse Change along Taiwo Road, Ilorin, Nigeria

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Abstract

It is against the background of continuous unguided residential landuse transition evident in Nigeria Urban centres with its associated spatial dimension and environmental implications that this paper evaluates the spatio-environmental dimension of residential landuse change along Taiwo road in Ilorin metropolis with the aim of preferring recommendations that will aid the achievement of sustainable urbanisation. To achieve this, 90 questionnaires were administered to respondents in randomly selected buildings within 300 meters delineated area along Taiwo road. Data collected were analysed along strata to give distance decay outfit for the study. The study discovered that the average rental value of buildings in the study area reduces with distance to Taiwo road. This is about N748, 000 for buildings within 100meters, N145, 000 for buildings within 200 meters and N79, 000 for buildings within 300 meters. Analysis of Variance F value of 10.409 with p-value of 0.000 at ? value of 0.005 reveals that this spatial variation is statistically significant. In response, numbers of storey of buildings and use of buildings among other characteristics varies across strata. Generally, the predominant landuse in the study area is commercial landuse (55.5

Index terms— land use, environmental dimension, spatial pattern

1 Introduction

uman existence and survival has witnessed series of changes and transitions over time. This is especially evident in the trend and pattern of the global demography which ranges from a mega scale of temporal increase in global population, to the micro level of variation in the distribution of population across continental and developmental lane. Human environmental dynamics is based on three critical dimensions: time, space and decision making (Bello and Arowosegbe, 2014). It reflects success of various stages of human adaptation processes, globalization and technological advancement evidenced in reduced mortality, increased fertility, and increased in birth rate among others. It took hundreds of thousands of years for the world population to grow to 1 billion -then in just another 200 years or so, it grew sevenfold. In 2011, the global population reached the 7 billion mark, and today, it stands at about 7.3 billion (UNFPA, 2016). This dynamics has not left out the urban-rural dichotomy as the current estimate of the United Nations revealed that the globe is now an urbanised haven. In recent years, the world has become more than one-half urban for the first time in history (54.5 percent in 2016)??more than 70 percent of the world's population lives in urban areas with less than 500,000 residents or in rural areas. Approximately one quarter (23.9 percent) of the world population lives in urban areas of 1,000,000 population or more. Less than 30 percent (28.6 percent) lives in urban areas with 500,000 or more population. More than 70 percent of the world's population lives outside urban areas with 500,000 or more residents (Demographia World Urban Areas, 2016) The continuous efflux of migrants of diverse socio economic characteristics as well as their associated factors is not the focus of this paper but their continuous dependence on usually limited and high competitive urban resources is the orient to which this paper points.

Land is one of three major factors of production in classical economics (along with labour and capital) and an essential input for housing and food production. (JunJie Wu, 2008). Despite its advantageous and life supporting characteristics, human unguided use of land has altered the structure and functioning of ecosystem (Fabiyl, 2006). Land, like every other resource in the urban area is usually of limited supply, high demand thus exorbitant price. Hence uses align themselves within the highly competitive urban space based on their ability to afford the price in anticipation for optimised returns. However, since urban centres grow usually out of existing rural or sub urban centres with dependence on another urban area, landuses in urban centres in their pre-urban times are usually residential. However, as the economic value of land increase possibly through the introduction of social services (e.g roads, schools, administrative) or growth pole factors (such as industries among others) uses which cannot afford the economic requirement of these lands, transits to new uses that can afford it. This is conceptualized by ??McGranahan et al, 2005) as global environmental change These changes which is inclusive of transition in urban landuse patterns stands to reflect the response of landusers to a number of institutional, economic, social and biophysical factors affecting transactions in land and the physical process of construction of buildings. It is worthy of note that these factors are usually interwoven, interactive and complicated. Decisions relating to landuse transitions interact at different organizational levels, and in a dynamic way to produce complex patterns of urban landuse ??Ademola, 2006).

Landuse changes are common phenomenon in any spatial development process. It is a necessary ingredient for economic development and social growth (JunJie Wu, 2008). It reflects man's thinking and survival attempt over time. For instance, globally, evident landuse changes are transition from agricultural land to built-up Area. While transition can take other patterns, its rate in urban centre is usually sporadic and evident. Infact, Yuri, (2009) observes that the most landuse transition in urban areas is from residential land use possibly to commercial land use. In some other cases to accommodate both previous use (residential) and new use (commercial), mixed development are usually introduced. These uses sometimes are usually not compatible especially with increase in the scale of commercial activities which can lead to environmental challenges for both land users. These challenges include air pollution, theft, noise pollution emanating from generators and other activities. Indeed, Landuse changes does not come without cost (Jun Jie Wu, 2008). Conversion of residential land use to another in Nigeria is a reflection of poor enforcement of the existing planning regulations (Olusina, 2008).

Taiwo road as the core of Ilorin Metropolis is not excluded from the scenario painted above as mere observation of the buildings along these roads show a complex interwoven pattern of residential, commercial and mixed development in no particular observable spatial order. Since the occurrence of landuse changes brings about questions on how the occurrence of land use changes took place and what are the strong factors that cause them to happen (JunJie Wu, 2008;Owoeye and Ogunleye, 2015), it is necessary to understand the change process in cities; its agent and beneficiaries which can be useful indicators in planning for functional cities (Fabiyl, 2006). It is against this background that this study evaluates the spatio-environmental dimensions of residential land use conversion along Taiwo road in Ilorin Metropolis with the aim of proffering recommendation that will aid the achievement of sustainable urbanization in the area.

2 II.

3 Literature Review

The concept of landuse change has been widely researched (Hald, 2009;Abiodun et al, 2011;Ogungbemi, 2012). Landuse Changes is the change of the use of land or buildings there on for a purpose which is different from that for which the land or building was originally zoned and intended for as Change of use as a concept tiptoed into development control arena by the fact that it is now regarded as development following an official endorsement or approval of the relevant development control department for any land development (Hald, 2009).Thus, change in use is occasioned by number of factors. Such factors are mostly, economic in nature (Ogungbemi, 2012). Landuse Change is an indirect consequence of economic growth (Fabiyl, 2006). It is a reflection of the eventual decision of landowners dependent on the expected value of each option to the owner (Owoeye and Ogunleye, 2015). It is any development or use which is different from the use last approved by the planning authority while he described material change in use as the physical alteration of existing zoning conforming structure. Earth surface is being significantly altered by man and this has had a profound effect upon the natural environment thus resulting into an observable pattern in the landuse over time (Abiodun, Olaleye, Dokai and Odunaiya, 2011).

Man continues to explore and exploit the natural resources in his environment and this has brought immense contribution to observable changes in land. Human alteration of the terrestrial surface of the earth are unprecedented in their pace, magnitude and spatial reach, of these, none are more important than changes in landuse and landcover as this has altered the structure and functioning of the ecosystem (Fabiyl, 2006). The magnitude of land use change varies with the time being examined as well as with the geographical area (Abiodun et al 2011). The assessment of these changes depends on the area, the land use types being considered, the spatial groupings, and the data sets used. In order to effectively address the issue of landuse changes process, a well-founded knowledge of underlying causes and driving forces is need (Rima, 2011; Oduwaye, 2015 both cited by Owoeye and Ogunleye, 2015).

4 III.

5 The Study Area

Ilorin in the North Central geo-political zone is one of the largest cities in Nigeria. The capital of Kwara State was founded by the Yoruba, one of the three largest ethnic groups in Nigeria in the Year 1450. The centrality of Ilorin within coordinates 8° 0' 30" N 4° 0' 33" E makes it to be easily accessible to all parts of the country by air, road transport or rail. Ilorin occupies an area of about 100km² (Oyegun, 1992).

6 Research Methodology

This study utilized a survey approach. Only quantitative data were obtained and utilized. Structured questionnaires were administered to residents located along Taiwo road in Ilorin Metropolis. To determine, the houses to be utilized for questionnaire administration, the spatial extent of Taiwo road was initially delineated on Google earth pro. Thereafter, buildings within 300 hundred meters on both sides of the road were further delineated and counted. Buildings within this delineated boundary were further stratified into 100 meters. Hence, three strata (A, B and C) were carved out of the delineated area. This was done to enable the determination of the distance decay effects of Taiwo road on landuse characteristics of adjoining land. In each stratum on both sides of the road, 15 questionnaires were administered to randomly selected buildings; in all, 90 questionnaires were administered. In each building, questionnaire was administered to the available oldest respondent (beyond 18 years of age). Information sought with administered questionnaires includes landuse characteristics of stratum, building conversion, causative factors as well as its environmental effects. Information obtained was subjected to both descriptive and inferential statistics. Descriptive statistics utilized for the study includes measure of central tendencies (such as mean and standard deviation) as well as generation of weighted indices through linear interpolation of 5 point likert scale for measuring of factors responsible for conversion of residential landuse. Pearson Chi square was used to evaluate the relationship between use of buildings across strata while Analysis of Variance was used to analyse the differences in the average annual rent of building across strata. Lastly, the relationship between building use and annual rent was assessed with the Analysis of Variance.

V.

7 Discussion of Findings

This section explicitly presents the findings from field survey a) Respondents Knowledge Of The Building And Area This sub-section ascertains the level of respondent's knowledge of the historical pattern of the use of building being occupied. Also, it is believed that older respondents tend to be enriched with information that has to do with the landuse trend of the area. From Table 1, it is evident that 38.9% of the respondents has occupied their current buildings for about 10 years while less than 3% of the respondents has occupied their current building for a period lesser than a year. However, little proportion of the residents (4.4%) has resided in the building for more than 16 years. Others are 35.6% that has occupied their current buildings for almost 5 years, 18.9% that has occupied their buildings for almost 15 years. Generally, as revealed in Table 1, larger percentage of respondents has ample knowledge of the building they occupy. This is derived as an aggregate of above 50% of the respondents has lived in their buildings for more than 5 years. This makes the respondents a good historian of the landuse trend of the study area.

8 c) Plot Size

The Minimum plot size in the study area is 450 meter square while the maximum is 1800 meter square (Table 2). However, the average plot size for any development is 750 meter square. This informs that land availability is limited along this route hence b) Building Characteristics Landuse as defined in this context is building based. As the purpose for which a building is used determines the name of landuse to be allocated for it. For instance, building completely utilised for habitation is referred to as residential landuse, buildings utilised for transaction of business as well as other commercial dealings is conceptualized as commercial landuse Others are industrial landuse which are buildings utilised for production or/and conversion of raw material into semi-finished/ finished products. Meanwhile, mixed landuse which is predominant in Africa is a combination of two or more uses within a building (these may be complimentary or non-complimentary).

developments are structural rather than lateral. This is ascertained as the buildings of two storeys and above is dominant in the area (Plate 2 and 3). The Plot size of buildings in the study area did not differ from what is obtainable in different urban centres due to scarcity of land and its associated competition. d) Average annual rent of building cost beyond N500, 000.00. This is comparatively higher compared to buildings in other part of the metropolis where monthly cost of room is within N24 ,000.00 to N30,00.00 per month . The inability of residential landuse to afford this rent (due to their non-economical characteristics) makes them to automatically transit to uses that can afford their pay. Predominately, the average annual rent of buildings in the study area (as revealed in Table 3) is within the range of N100,000.00 to N200,000.00. This implies that the monthly cost of a building will be within the range of N10,000.00 to N20,000.00. Infact, a good proportion (15.2%) of the sampled buildings annually e) Average annual rent of building across strata From a descriptive perspective evident in Table 4, there is an obvious variation in the average annual rental values of buildings in the respective strata. For

buildings within 100 meters, the average annual value is N748, 000.00 $\pm$ 1078701SD, this declined to an average annual rental value of N145,800.00 $\pm$ 15385SD for buildings within 200 meters to the road and a sharp fall in price to N79,993.00 $\pm$ 37103SD for buildings within 300. This decline informs that there is difference in the cost of land and associated buildings with respect to their distance to the road. To ascertain the distance decay effect of road on the rental value of buildings in the study area, Analysis of Variance was used implored. This was used to evaluate the variation in the average annual rental value of buildings across stratum. From Table 5, the F value of 10.409 confirms that there is difference in the average annual of rent of buildings with respect to their respective distance to the road. The pvalue of 0.000 which is lesser than the α -value of 0.05 ascertains that the variation as explained by the F-value is statistically significant. To optimise return from use of land especially at the sight of scarce land, developers in the study area depends on development of high rise buildings. (i.e storey buildings). This is inferred as all (100%) the sampled buildings are storey buildings (i.e buildings with more than one floor). However, as revealed in Table 6 and typified in Plate 2 and 3, 1 storey building dominates the study area as it accounts for 83.3% of the total sampled houses. This is distantly followed by 2 storey buildings which accounts for 14.4% of the sampled buildings. Meanwhile a mere proportion of 2.2% of buildings in the study area is 3 storey while none of the building is 4 storey and above. The implications of this include increase in the density (human per space) of the area. Spatio-Spatio-Environmental Dimension of Residential Land use Change Along Taiwo Road, Ilorin, Nigeria g) Previous use of Building

It is evident from table below that there are temporal changes in the use of buildings (invariably land use) in the study area. Specifically, there is a change in the proportion of buildings converted from residential purposes to other purposes in the study area within the period of 10 years. In the year 2005, about 43% of the sampled buildings were used for solely residential purpose; this decreased to 25.5% in the year 2010 and further slide 16.6% in the year 2016. These buildings were converted for other uses which are mostly commercial and mixed uses. It is further revealed in Table 7 that buildings utilised for commercial purposes increased from 30% in 2005 to 36.6% in 2016. Conversion of buildings from residential to commercial which is evident in the study area reflects no cognisance of spatial planning. This is deduced as most of these developments (i.e conversion of use of building) were done without obtaining planning permits from appropriate town planning offices. As evident in Plate 4 and 5, residential building transition features conversion of rooms for warehouses, shops and stores among others while at the extreme reconstruction for commercial purpose. This scenario reflects development control officials negligence among others. Another use that has witnessed building gain is mixed land use which usually is a mixture of residential land use and commercial land use (street trades and corner shops). This is a growing phenomenon in the study area as one can hardly see a residential building without one of its room converted for business purpose or its frontage used as display centres.

9 h) Use of building across strata

There is variation in the use of buildings across strata. The noticeable pattern is that dominant use within 100 meters to Taiwo road is Commercial land use. This aside from physical observation is informed as (76.7%) of buildings within the area is solely for commercial purposes. Meanwhile as the distance increases from road network, there is high occurrence of other land uses (i.e residential and mixed). For instance, at 100 meters distance to road network, 10.0% of land use is Plate 4 and 5: Residential Building respectively converted to mixed and commercial land Source: Authors survey, 2016 committed to mixed development. This increased to 40.0% at 200 meters but declined to 23.3% at 300 meters. While the factor associated with mixed land use decline in 300 meters away from the road is traceable to increase in the proportion of residential development (i.e 23.3%), developers or estate agents prefers to use buildings that are directly adjoining to roads for shops, as these use possesses optimised financial returns comparatively to other uses in the zone. The chi-square value of 12.38 reported on Table 8 informs that there is a variation in the use of land across strata; however, the pvalue of 0.054 which is greater than the α -value of 0.050 implies that this variation is not statistically significant. This subsection examines the possible factors responsible for unguided conversion of residential land uses to commercial and mixed land use. It is however worthy of note that these factors are systemic and organic. From Table 9, it can be deduced that the major factor responsible for transition from residential use to other use is the presence of Taiwo road as it accounts for a deviation index of 0.20. The road which serve as both growth pole factor and transportation route has attract to itself different commercial land uses which compete for space to enjoy both access and mobile customers. This led to increase in commercial activities (0.15) such as banks, sales outlets which are able to afford the rental cost of land.

The agglomeration of these commercial activities as well as their desire for enjoyment of its associated benefits make them to continuously increase thereby causing an increase in demand for commercial properties (0.002) as well as optimising investment returns (0.06) for developers and landlords who will prefer to convert the land uses to accommodate uses that can optimise their profits. It is however unfortunate that these takes place in the sight of poor development control (0.1) exhibited by physical planning experts and other urban gatekeepers in different government ministries. It is in response to these set of interconnected factors that residential uses fizzles out for both commercial and mixed land uses.

10 VI. Conclusion and Recommendation

From the foregoing, it is evident that there is an intricate relationship between urbanization, landuse change and environmental deterioration. This then answer in part rhetoric questions bothering on the situation of urban centres in Nigeria as haven of environmental ills, because, as urban centres become urbanised in the sight of unguarded development, environmental challenges emanates thereby creating more of problems than envisaged. While the environmental realities of urbanization (inclusive of landuse changes) continues to stare us in the face, how then do we ensure that landuse changes are carried out

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1. Awareness on the need of development Permit for Change of Use: there is every need for massive awareness using several medium such as media prints, radio and television programmes on the need for development for every change of use. Education changes perception and attitude towards phenomenon, hence when developers and landlords are educated, their attitude will positively change.

2. Environmental Impact of Project during Planning:
there is every need to extensively carry out environmental impact analysis of any social infrastructure (such as roads) before it is carried out. This will help in the fixation of systems and methods towards reducing or averting any potential environmental impacts of projects.

3. Environmental Auditing: Environmental audit of developments along Taiwo road should be carried out, this will help ascertain in quantitative terms, the extent of environmental damage (inclusive of landuse change) that has been done in the area. This will be the basis on which policy direction will be made.

11 Establishment of Focused Relevant Government

Agencies: Government agencies such as Capital Territory/ Metropolitan Development Authority; Building Control Agency should be established in Kwara State with strict focus on the ensuring compliance with building codes as well as zoning in the metropolitan area. This agency when established should survey the study area, then proceed on resubmission of development plans for approval. Using this method, updated landuse information about the study area can be generated and control will be enabled.

12 Development of Landuse Contingency Plan: Since

these development are more of irreversible (especially places where total conversion has taken place), contingency landuse plan for the study area should be developed to cater for the existing situation as well as chart a course for future landuse pattern of the metropolis.

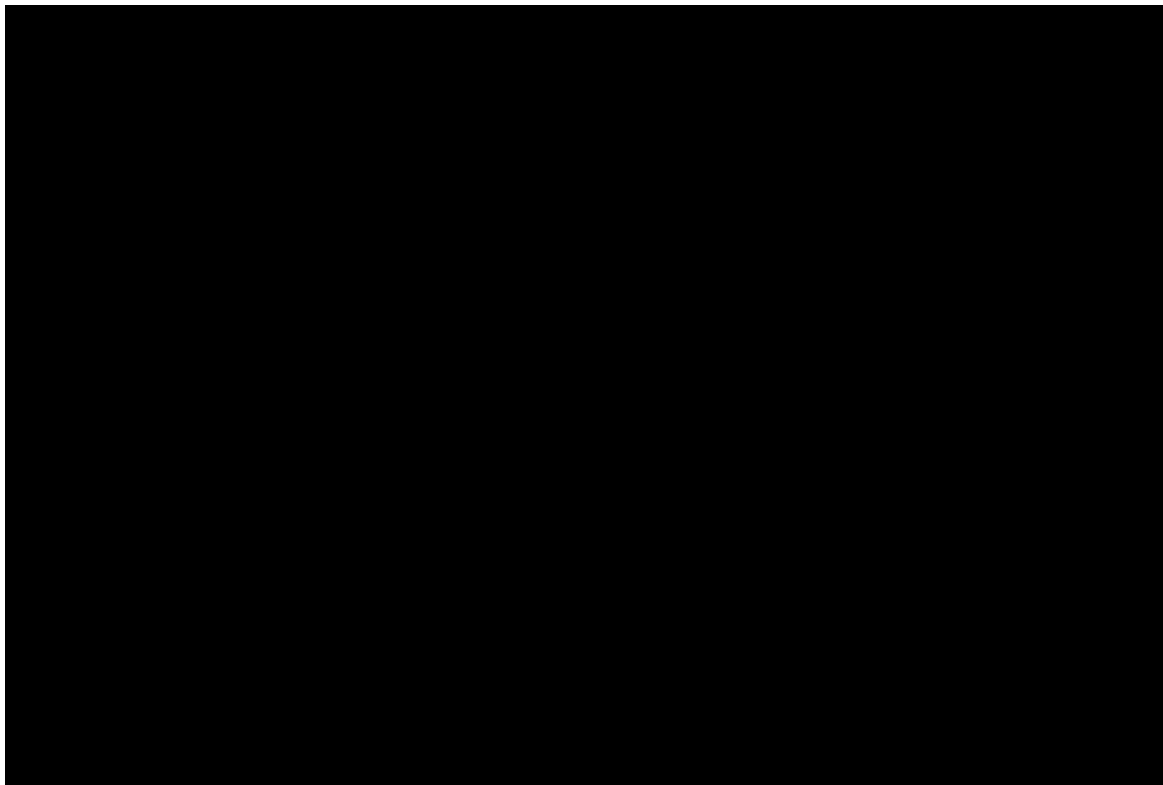


Figure 1:

Year 2016

(B)

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	N	Minimum	Maximum	Range	Mean	Std. Deviation
plot size	90	450.00	1800.00	1350	756.3889	382.60199

3

Average annual rent	Frequency	Percentage
N100,000.00 and below	0	0
N100,001.00 -N200,000.00	38	42.1
N200,001.00 -N300,000.00	8	8.9
N400,001.00-N500,000.00	7	7.8
N500,000.00 and above	14	15.2
Total	90	100.0

Source: Authors work, 2016

4

N within 100 meters 30 748003.8760 1078701.57543 196943.06189 345210.0880 1150797.6640 1800.00 Mean S

Total	90	1800.00	5.00E+006
	324579.0698		
	687964.33147		
	72517.80788		
	180487.7302		
	468670.4094		

Source: Authors work, 2016

[Note: © 2016 Global Journals Inc. (US) Spatio-Environmental Dimension of Residential Land Use Change Along Taiwo Road, Ilorin, Nigeria]

Figure 5: Table 4 :

5

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	8133061759473.589	2	4066530879736.794	10.409	.000
Within Groups	33990186242851.996	87	390691795894.851		
Total	42123248002325.586	89			

Source: Authors work, 2016

f) Storey of Building

Figure 6: Table 5 :

6

Year 2016

2 40 64

		Storey of Building	Frequency	Percentage
(B)	Global Journal of Human Social Science -	No storey	0	0
		1 storey	74	83.3
		2 storey	13	14.4
		3 storey	2	2.2
		4 storey and above Total	0 90	0 100

[Note: Source: Authors work, 2016 Source: Authors work, 2016 © 2016 Global Journals Inc. (US) s Volume XVI Issue VI Version I © 2016 Global Journals Inc. (US)]

Figure 7: Table 6 :

7

	2005		2010		2016		
Landuse	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	
Residential	39		43.3	23	25.5	15	16.6
Commercial	27		30.0	25	27.7	33	36.6
Industrial	3		3.3	5	5.6	4	4.4
Mixed	21		23.3	37	41.2	38	42.2
Abandoned	0		0	0	0	0	0
Total	90		100	90	100	90	100

Source: Authors survey, 2016

Figure 8: Table 7 :

8

of building					Total
residential Commercial industrial mixed					

Figure 9: Table 8 :

9

S/N	Variables	5	4	3	2	1	FWV	NR(F)	Factors Index	X	D	D 2
		SA	A	U	D	SD			FWV/ NR (F)			
1	Presence of Main Road	424	24	0	0	0	448	90	4.97		0.20	0.04
2	Increase in	357	84	0	0	0	441	90	4.90		0.15	0.02

Figure 10: Table 9 :

10

Figure 11: Table 10 ,

10

Factors	SA	A	U	D	SD	WMS	RANKING
Housing Shortage	50	16	10	0	14	4.15	9 th
Poor Aesthetics	54	35	0	0	1	4.38	6 th
Noise	65	22	1	2	0	4.64	1 st
Waste generation	45	20	10	15	10	3.82	11 th
Lack of Potable water	60	24	4	1	1	4.62	2 nd
Poor road	30	10	2	35	23	2.99	12 th
Poor drainage	45	28	0	0	17	4.20	8 th
Poor Sanitation	63	18	1	2	6	4.59	4 th
High crime rate	60	20	0	9	1	4.55	5 th
High Occupancy ratio	52	5	4	0	19	3.95	10 th
Air pollution	40	39	5	3	3	4.31	7 th
Epileptic power supply	60	23	5	2	0	4.61	3 rd

Note: Strongly Agreed=SA, Agreed =A, Undecided=U, Disagreed=D, Strongly Disagreed=SD
Source: Authors work, 2016

Figure 12: Table 10 :

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²(B)

³Spatio-Environmental Dimension of Residential Land Use Change Along Taiwo Road, Ilorin, Nigeria

⁴Spatio-Environmental Dimension of Residential Land Use Change Along Taiwo Road, Ilorin, Nigeria Plate 2 and 3: Sets of storey buildings in the study Area

⁵(B)

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