The Peculiar Nature of Land Use Dynamics in Nigeria

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Abstract

Nigerian cities are experiencing rapid non-complementary land use dynamics. Many residential dwellings in established neighbourhoods have been converted to illegal mixed land uses, especially commercial activities. Efforts made by the government to address the problem such as demolition of illegal structures and preparation of urban master plans have not yielded the desired results. The problem still persists because of poor understanding of the peculiarity of the nation's land use dynamics. The goal of this study was to identify and characterize the peculiar nature of land use dynamics in Nigeria. Primary data on the nature of land use dynamics used in this study were collected through questionnaire from two Nigerian cities. These are Enugu and Benin-city, which were selected to represent inorganic and organic cities respectively. Principal component analysis was used to identify and characterize the peculiar nature of land use dynamics. The results found four and three types of peculiar non-complimentary mixed land uses in Enugu and Benin City respectively which were largely driven by informal sector activities. The study recommended, among other things the incorporation of the peculiar nature of land use dynamics into urban development programs in Nigeria.

Keywords: *Land use dynamics, Inorganic, organic, Cities, nature, peculiar*

INTRODUCTION

One of the challenges confronting Nigerian cities is the nature of land use dynamics, which has gained prominence in the built-up areas. Nigerian cities such as Lagos, Ibadan, Kano, Bauchi, Owerri, Enugu and Benin City are experiencing rapid non-complementary land use dynamics. For example, many residential dwellings in established neighbourhoods have been converted to illegal mixed land uses, especially commercial activities. The number of business activities taking place within and round residential buildings has increased considerably with attendant land use change (Onyebueke, 2000). These activities include provision stores, beer parlours, hair dressing salons, barber shops and carpenter sheds. Coupled with this is the pervasive nature of locating petrol filling stations, commercial banks and other financial institutions in residential neighbourhoods and streets. These areas consequently develop into slum, squalid and unhealthy living environment (Aina, 2000).

Successive policy makers have embarked on preparation of urban master plans and demolition of illegal structures in response to the nature of land use dynamics in Nigerian cities. Despite the efforts, incidence of land use dynamics has significantly increased, thus resulting in non-complementary mixed land uses, which have characterized cities in Nigeria. The failure of government policy on land use dynamics may be attributed to inability of policy makers to understand and incorporate the peculiar nature of land use dynamics into physical planning programmes. As a result, all efforts have not yielded the desired result.

The goal of this study is to identify and characterize the nature of land use dynamics in Nigerian cities. This is with a view to establishing its peculiarity to Nigeria. The outcome of the study is capable of enhancing measures towards formulating appropriate physical development policy in Nigeria.

Literature Review
Empirical studies have been carried out on the nature of land use dynamics in Nigeria and other countries. Njungbwen et al (2008) evaluated the land use changes and the impact on the Uyo urban settlement, Nigeria between 1964 and 2004. The result showed that agricultural land constantly dropped in land area whereas the residential, industrial, institutional and transportation uses recorded increases in spatial extent. The study revealed that the rates of loss of agricultural land stood at 0.33 and 4.26 percent between 1969 and 1978 and 2001 and 2004 respectively.

Omuta and Ikhuoria (2000) studied the relationship between the nature of land use characteristics and poverty in Nigeria. The result showed that 18 percent of the residential areas in the urban centres were blighted due to building congestion, over populated dwellings, narrow streets and lack of public utilities and services. They recommended strict enforcement of development control regulations as a panacea for better and healthier living environment in Nigerian cities.

Similarly, Okosun and Ezeadichie (2006) examined the impact of urban poverty on land use conversion in Owerri, Nigeria. The result indicated that increasing percentage of urban poverty strongly contributed to the increase in land use changes. This has occasioned corresponding deterioration in neighourhood quality and slum formation in the city. Nigerian Institute of Town Planners Enugu State Chapter (2005) studied the nature of land use changes and

its manifestations in Enugu, Nigeria. The result showed that there were gross violations on the city space which have created chaos, incompatibility of land uses and disorderly urban environment.

Oluseyi (2006) examined the process of urban land use changes in a Nigerian city of Ibadan between 1972 and 2003. The result revealed that the land use types underwent significant changes. The low residential area changed to high density area by $0.28km^2$ while peripheral urban development changed by $0.06km^2$. According to him, this reflects urban development in the atmosphere of inappropriate development control measures.

Hassan and Adejumo (2005) identified various forms of land misuse and the attendant implications in Nigerian cities. The result showed that many areas of land have disappeared in large part as a consequence of land misuse that include oil, gas, agricultural, industrial, commercial and residential development. Okeke (2000) examined the impact of poverty alleviation on urban land-space in Nigeria. The result showed that the current mode of informal sector operation impacts negatively on orderly land use development in Nigeria. He recommended for strategic or proactive environmental management in the country.

Tokula and Ejaro (2013) assessed land use/land cover changes and the effect on agricultural land in Anyigba, Kogi State, Nigeria. The result showed that the agricultural land which occupied $11.8km^2$ in 1987 reduced drastically to $7.5km^2$ in 2011. Consequently, the built-up area increased from $3.0km^2$ to $10.7km^2$ during the period under study.

Birstein (1993) conducted a study on land use conversion in Egypt. The result showed that more than 10 percent of the nation's productive farmlands have been

converted to urban land uses during the last 30 years. Maitima et al, (2000) observed the influence of land use changes on the basic resources on land in the Basin of Lake Victoria covering Ethiopia, Kenya and Tanzania. The result indicated that land use in the Basin is changing fast with impact on sustainability of the natural system on which productivity depends in East Africa.

Hite, et al, (2005) showed that in Delaware County in Ohio, U.S.A, 27,756, acres, 3,086 acres and 433 acres of agricultural lands were converted to residential, commercial and industrial uses respectively. The study observed that the change was heavily concentrated in the southern townships closest to Colombia. Ezdi (2009) studied the land use dynamics in the inner city of Lahore in Pakistan. The result showed that, over time, the Mochi Gate locality developed into a centre for wholesale, small-scale manufacturing and support services which are based on informal enterprises.

USGS (1999) evaluated the impact of land use changes in United States over time. The result revealed that most metropolitan areas in America face increasing problems of urban sprawl, loss of natural vegetation and open space, among others. It opined that many of the farm lands, wet lands, forests and deserts in America have been converted to urban settlements during the last 100 years.

Duchasne et al (2010) examined the land use changes in Beirut (Lebanon) and Los Angeles (USA) from 1988 to 2007. The result showed that Beirut experienced a rapid population growth which contributed 19.21 percent increase in built –up land and 25. 57 percent decline in green land. In Los Angeles, 10 percent increase in population led to 4.22 percent increase in built-up area and 1.14 percent decrease in green land. They opined that developing countries are likely to lose greater percentages of forested areas to urban development due to rapid population growth and economic development.

Hasyim et al (2011) analyzed urban land use change in Surubaya city in Indonesia for 20 years. The result revealed that between 1990 and 2009, green areas in the city decreased by $124.5km^2$ due to land use changes. The average reduction in green areas from 1990-2000 and from 2000-2009 was $8.1km^2$ and $4.8km^2$ respectively. Urban growth was higher in the last 10 years, covering an area of $27.km^2$ compared to $18.1km^2$ covered in previous 10 years.

It is apparent from the reviewed literature that there is dearth of study on character and nature of land use dynamics in Nigerian cities and other countries. This gap in literature has provided the ground for this study.

METHODOLOGY
Primary data on the nature of land use dynamics used in this study was collected with the aid of questionnaire from two cities in Nigeria. The two cities, namely Enugu and Benin City were selected to represent inorganic and organic cities respectively. The Williams (1978) formula as was adopted by Kerlinger and Lee (2000) was employed to determine the sample size from the populations of the respective cities. Stratified sampling technique was applied to select the respondents for the study which is consists of land use planners, developers and household heads. A total of 610 copies of questionnaire were distributed in Enugu and 586 copies, representing 96.1 were returned. Similarly, out of 948 copies of questionnaire that were distributed in Benin City, 932 copies, representing 98.3 percent were returned.
Principal component analysis was used to identify and characterize the peculiar nature of dynamics in Nigeria. The

formula for principal component analysis is given as:

$$F = \sum j\text{-}I\ W_1 Xj = W_1 X_1 + W_2 X_2\ W_n X_n \quad (1)$$

Where

$Wj - W_n$ = factor weights

$Xj - X_n$ = original variables

The principal component analysis in equation (1) was applied in this study as:

$$F = \sum_{j=i}^{n} \quad ND = W_1\ crof + W_2\ crr,\ W_3\ crch + W_4\ culr + W_5\ crs + W_6\ cri + W_7\ crslb + W_8\ crs + W_9\ coc + W_{10}\ cumw + W_{11}\ crrc + W_{12}\ crc + W_{13}\ csc \quad (2)$$

Where:

ND   = Nature of land use dynamics.

crof   =Conversion of residential buildings to offices and other formal uses.

crr   =Conversion of residential buildings to religious activities.

crch   =Conversion of residential buildings to clinics or hospitals.

culr   = Conversion of unusable land to residential use.

crs   =Conversion of residential buildings to schools.

cri   =Conversion of residential buildings to industrial use.

crslb   = Conversion of roadside space to location of bill boards.

crs   =Conversion of residential plots to petrol filling stations.

coc   =Conversion of open spaces to car wash.

cumw =Conversion of undeveloped plots to mechanic workshops.

crrc   =Conversion of road reserves to commercial use.

csc   =Conversion of sidewalks to car parks.

$W_1 - W_n$ are as already known in equation one.

Analyses and Discussion
Enugu (Inorganic City):
The results of the analyses identified and classified the peculiar nature of land use dynamics in Enugu into non-complementary four types of mixed land uses. These are: Residential/commercial/ institutional/industrial uses, recreational/ commercial/industrial/ transportation uses, residential/commercial/transportation uses and residential/ commercial/ institutional uses (see table 4). The implication of these results with regard to each of the identified four types of mixed land uses are as follows:

Residential/institutional/commercial/industrial mixed land uses:
These consist of unapproved land use conversions from: residential to clinics/hospitals (institutional), roadside space to location of bill boards (commercial), residential buildings to industrial use, residential buildings to religious activities and residential buildings to offices and other formal uses. Others are undeveloped plots to mechanic workshops, unsuitable land to residential use and residential buildings to schools (see table 1).

Table 1: *Eight Types of Land Use Conversions and their Factor Loadings*

Types of Land Use Conversion	Factor Loading
Residential buildings to hospitals.	.959
Roadside space to location of bill boards	.924
Residential buildings to industrial use	.912
Residential buildings to religious activities	.842
Residential buildings to offices and other formal uses.	.842
Residential buildings to schools	.580
Unsuitable land to residential use	-.583
Undeveloped plots to mechanic workshops	-.763

The implication of the results is that land use conversion from residential buildings to clinics/hospitals was more prevalent than other types of mixed land uses (.959) under this category. It was followed in descending order by land use change from:

roadside space to location of bill boards and outdoor posters (.924), residential buildings to industrial use (.912), residential buildings to religious activities (.842), residential buildings to offices and formal uses (.842), residential buildings to schools (.580), unsuitable land (natural drainage channels, wetlands, etc.) to residential use (-.583), and undeveloped plots to mechanic workshops (-.763).

This mixed land use classification accounted for 37.7 percent of the peculiar nature of land use dynamics in Enugu. This is an indication that 32.7 percent of the peculiar nature of land use dynamics in Enugu was made up of residential/institutional/commercial/industrial mixed land uses. Furthermore, land use conversions from undeveloped plots to mechanic workshops, and unsuitable land to residential use have negative impact on Enugu. This indicates that the problems of the peculiar nature of land use dynamics are more severe as a result of land use conversion from residential buildings to clinics or hospitals as well as from undeveloped plot to mechanic workshops

than the other 6 types of land use conversions.

Residential/recreational/commercial/industrial/transportation mixed land uses

This comprises 6 types of land use conversions. These are in the descending order from: undeveloped plots to mechanic workshops (light industrial use), residential building to commercial use, roadside walk to car park (transportation use), and public road reserves to commercial and industrial uses, and residential plots to petrol filling stations (commercial/transportation uses). These are shown in table 2. The implication of these results was that land use conversion from incidental open spaces to car wash was the most common under this type of mixed land use classification (.856). It was followed in descending order by land use conversions from: residential buildings to commercial use (.760), public road reserves to commercial and industrial uses (.601), undeveloped plots to mechanic workshops (.574), roadside walk to car park (.570) and residential plots to petrol filling stations (-.560).

Table 2: Six Types of Land Use Conversions and their Factor Loadings

Types of Land Use Conversion	Factor Loading
Incidental open spaces to car wash.	.856
Residential buildings to commercial use.	.760
Public road reserves to commercial and industrial uses.	.601
Undeveloped plots to mechanic workshops.	.574
Roadside walk to car park.	.570
Residential plots to petrol filling stations.	-.560

This type of mixed land use classification was responsible for 25.26 percent of the peculiar nature of land use dynamics in Enugu. This indicates that 25.3 percent of the peculiar nature of land use dynamics in Enugu was made up of residential/recreational/commercial/industrial/transportation mixed land uses. It shows that incidental open space, side walk and public road reserves have been converted to commercial and light industrial uses. However, land use

conversion from residential plots to petrol filling stations showed a negative impact. This is an indication that the problem of peculiar nature of land use dynamics in Enugu is more severe with land use conversion from residential plots to petrol filling stations than the other 5 types of land use conversions.

Residential/commercial/transportation mixed land uses:

This consists of land use conversions

from: residential plots to petrol filling stations (commercial/transportation uses), public road reserves to commercial and industrial activities and unsuitable land to residential use (see table 3)

Table 3: *Three Types of Land Use Conversions and their Factor Loadings*

Types of Land Use Conversion	Factor Loading
Residential plots to petrol filling stations.	.821
Public road reserves to commercial and industrial uses.	.637
Unsuitable land to residential use.	.600

Table 3 indicates that conversion from residential plots to petrol filling stations was more prevalent than others under this type of mixed land use classification. It was followed by land use conversion from public road reserves to commercial and industrial uses (.637). The least was conversion from unsuitable land to residential use with a factor loading of .600. The implication of the result is that the problem of the peculiar nature of land use dynamics in Enugu is severe as a result of residential/ commercial/ transportation mixed land uses. This type of mixed land uses accounted for 21.2 percent of the peculiar g nature of land use dynamics in Enugu. This is an indication that 21.2 percent of the peculiar nature of land use dynamics in Enugu was made up of residential/ commercial/transportation mixed land uses.

**Residential/commercial/institutional mi xed land uses:**

This consists of land use conversions from: residential to commercial use and residential buildings to schools (institutional use). Land use conversion from residential buildings to schools is more common (.767) than conversion from residential to commercial use (.590). This type of mixed land use was responsible for 20.6 percent of the peculiar nature of land use dynamics in Enugu. This affirmed that land for residential use is diminishing in favor of other land uses in the city. Also, it showed that the peculiar nature of land uses dynamics is severe as a result of residential/commercial /institutional mixed land uses.

In overall, the identified four types of mixed land uses cumulatively accounted for 100 percent of the peculiar nature of land use dynamics in Enugu. This indicates that the four types of mixed land uses are the characteristics of the peculiar nature of land use dynamics in the city. A breakdown showed that the type of mixed land use classified as residential /commercial/ industrial uses were most prevalent (32.7%) in Enugu. It was followed in descending order by institutional/commercial/industrial/transpo rtation mixed land uses (25.3%), resid-ential/ commercial/transportation mixed land uses (21.2%) and residential/comme-Rcial/ institutional mixed land uses (20.6%). This was shown in table 4 and figure 1.

Table 4: *Four Types of Mixed Land Uses and their Percentages in Enugu*

Types of Land Use Conversion	Percent
Residential/institutional/commercial/industrial uses.	32.7
Residential/institutional/commercial/industrial/transportation use.	25.26
Residential/commercial/transportation uses.	21.2
Residential/commercial/institutional uses	20.6
Total	**100**
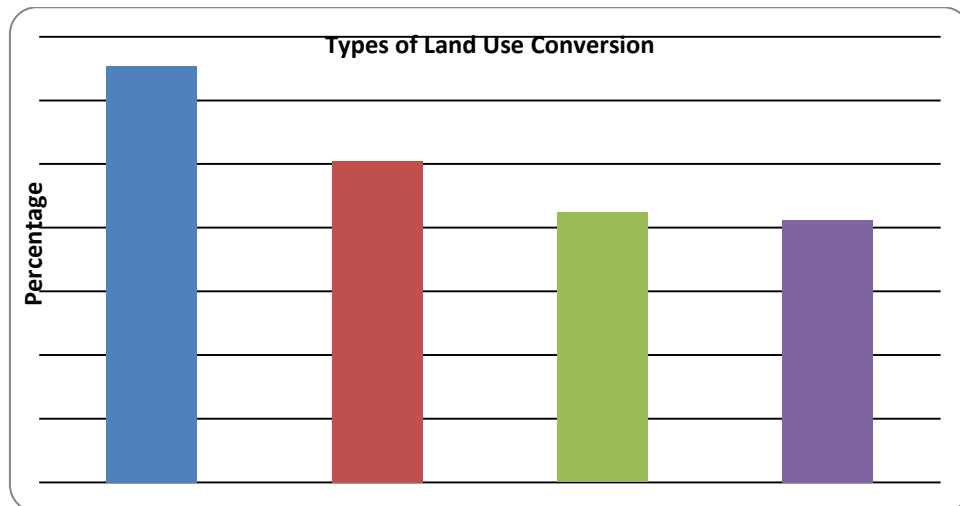
Figure 1: *The four peculiar types of land use dynamics in Enugu.*

The four aforementioned types of mixed land uses were commonly found among low, medium and high density neighbourhoods in Enugu. The peculiar nature of land use dynamics in Enugu, which are characterized by mixed land uses, depicts informal land use. This implied that informal sector activities are the drivers of urban land use dynamics in Enugu and other inorganic cities in Nigeria. Therefore, the nature of land use dynamics in inorganic cities in Nigeria is peculiar and different from formal land use planning theories upon which physical development policies was predicated in Nigeria and developed countries. Non consideration of peculiar nature of land use dynamics in land use planning may have been responsible for failure of physical development policy in Nigeria.

Benin City (Organic City)
The result of the analysis identified and classified the peculiar nature of land use

dynamics in Benin City into three types of non-complementary mixed land uses. These are residential/commercial/industrial/recreational/institutional uses, residential /transportation/industrial/institutional uses and residential/ commercial/ transportation uses (see table 7). The implication of the results with regard to each of the identified three types of mixed land uses are as follows:-

Residential/commercial/industrial/recreational/institutional mixed land uses
This consists of land use conversions from: undeveloped plots to mechanic workshops, incidental open spaces to car wash, residential plots to petrol filling stations, roadside walk to commercial and industrial uses, and public road reserves to location of bill boards. Others are residential buildings to offices and other formal uses, residential buildings to schools and residential buildings to religious activities (see table 5).

Table 5: *Eight Types of Land Use Conversions and their Factor Loadings*

Types of Land Use Conversions	Factor Loading
Incidental open spaces to car wash	.976
Residential buildings to offices and other formal uses	.976
Undeveloped plots to mechanic workshops	.922
Residential plots to petrol filling stations.	.846
Roadside walk to commercial and industrial uses.	.832
Residential buildings to schools	-.820
Road reserves to location of bill boards.	-.823
Residential buildings to religious activities.	-.976

Land use conversions from**:** incidental open

spaces to car wash (.976) and residential

buildings to offices and other formal uses (.976) were most common under this type of mixed land use classification. However, land use conversion from residential buildings and religious activities (-.976), public road reserves to location of bill boards (-.823) and residential buildings to schools (-.820) have negative impacts in Benin City. This indicates that the problems of the peculiar nature of land use dynamics are more severe with the 3 types of land use conversions than was case with the other 5 types of land use conversions.

This type of mixed land use classification accounted for 51.2 percent of the peculiar nature of land use dynamics in Benin City. By implication, more than 50 percent of the peculiar nature of land use dynamics was characterized by non-complementary residential/commercial/industrial/recreational / institutional mixed land uses. Furthermore, the result showed that residential use, open spaces, roadside walk and public road reserves in Benin City are decreasing in favor of other land uses with residential use mostly affected. It is followed by open spaces, roadside walk and public road reserves in descending order.

Residential/transportation/industrial/institutional mixed land uses

This classification comprises 4 types of land use changes. These include land use conversions from: unsuitable land to residential use, roadside walks to car park, residential buildings to industrial use and residential buildings to clinics or hospitals (see table 6).

Table 6: *Four Types of Land Use Conversions and their Factor Loadings*

Types of Land Use Conversion	Factor Loading
Unsuitable land to residential use.	.981
Roadside walk to car park	.972
Residential buildings to industrial use.	.972
Residential buildings to hospitals	-.981

Land use conversion from unsuitable land to residential use (.981) was more prevalent under this type of mixed land use classification. However, land conversion from residential buildings to industrial use was least common and has negative impact in Benin City. This is an indication that the problem associated with the peculiar land use dynamics is more severe with conversion from residential buildings to clinics or hospitals than the other 3 types of land use conversions. This type of mixed land use classification accounted for 32.5 percent of the peculiar nature of land use dynamics in Benin City. This indicates that 32.5 percent of the peculiar nature of land use dynamics in Benin City was characterized by a type of mixed land use classified as residential/ transportation/ industrial/ institutional uses. This is an affirmation that residential use, roadside walk and unsuitable land are giving way to other land uses.

Residential/commercial/transportation mixed land uses

This consists of land use conversions from: residential to commercial use (.919) and road reserves to location of bill boards (-.535). This implies that land use conversion from residential to commercial use is more common than conversion from public road reserves to location of bill boards. The negative impact shown by land use conversion from road reserves to location of bill boards is an indication that the problem associated peculiar nature of land use dynamics is more severe with it than conversion from residential to commercial use. This mixed land use classification was responsible for 13.9 percent of the peculiar nature of land use dynamics that exists in Benin City. This implies that 13.9 percent of the peculiar
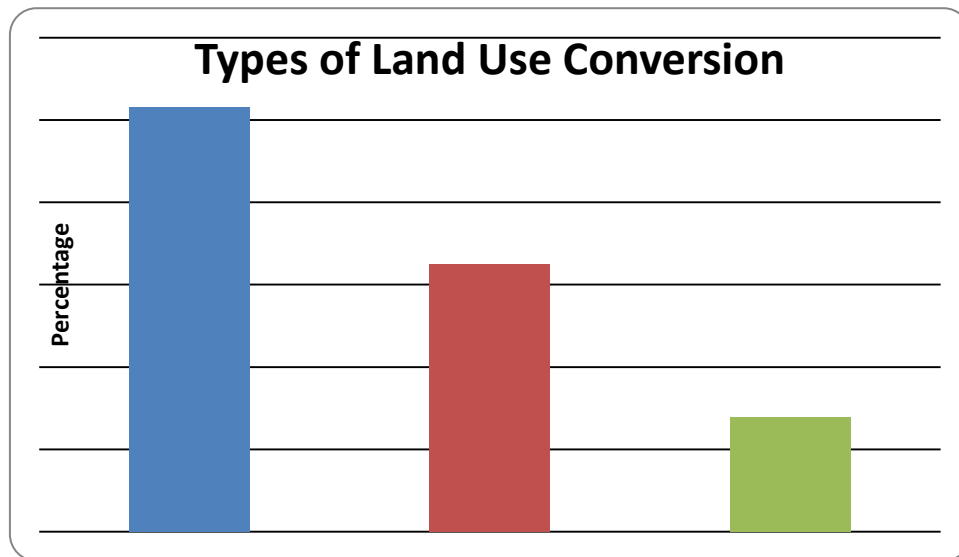
nature of land use dynamics in Benin City is characterized by a type of mixed land uses classified as residential/ commercial/ transportation uses.

In overall, the identified 3 types of mixed land uses cumulatively accounted for 97.6 percent of the peculiar nature of land use dynamics in Benin City. A breakdown showed that the type of mixed land uses classified as residential/ com-mercial/ industrial/ recreational/ institutional uses was most dominant (51.6%) among the 3 types of mixed land uses identified in Benin City. It was followed in descending order by residential/ transportation/ industrial/ institutional uses (33.5%) and residential/ commercial/ transportation uses (13.9%). This was shown in table 7 and figure 2.

Table 7: Three Types of Mixed Land Uses in Benin City

Types of Land Use Conversion	percent
Residential/commercial/industrial/recreational/institutional uses	51.6
Residential/transportation/industrial/institutional uses.	32.5
Residential/commercial/transportation uses.	13.9
Total	**97.6**

Figure 2: The three peculiar types of land use dynamics in Benin city.

The three aforementioned types of mixed land uses were commonly found in low, medium and high density neighbourhoods in Benin City. The three types of mixed land uses, which characterized the peculiar nature of land use dynamics in Benin City, depict informal land use. This is also an indication that urban land use dynamics in Benin City and other organic cities in Nigeria are driven by informal sector activities. The outcome of this result concurred with the findings in Enugu. It shows that the nature of land use dynamics in Benin City and other organic cities in Nigeria is peculiar and different from the existing land use planning theories in Nigeria and developed countries, which is based on formal planning. This is an affirmation of the earlier finding that the non incorporation of the peculiar nature of land use dynamics in formulating land use planning is likely responsible for the failure of physical development policy in Nigeria.

RECOMMENDATIONS
There is the need for policy makers to incorporate the peculiar nature of land use dynamics into formal land use planning in Nigerian cities. Therefore, the preparation of master plans should be guided strictly by this reality because of its influence on

shaping urban land use structure. This will help to provide a sound framework for functional strategies for physical development in Nigeria.

Comprehensive review and amendment of all existing development control measures is needed in order to meet the present physical and socio-economic challenges in our cities. This will go a long way in providing a sound basis for promulgating more workable measures to effectively tackle the problems of land use changes that have characterized urban centers in the country.

The Federal Government should encourage more researchers with focus on informal sector as a determinant factor of land use dynamics. The outcome of such researches will enable policy makers to formulate urban land use planning policies and programmes for guiding environmentally sustainable development in Nigeria.

CONCLUSION
The study identified and characterized the peculiar nature of land use dynamics in Nigeria, using Enugu and Benin City as case studies. The results showed that four and three types of non-complementary mixed land uses exist in Enugu and Benin City respectively. This implies that non-complementary mixed land uses have characterized the nature of land use dynamics in the two cities. In other words, the nature of land use dynamics in both inorganic and organic cities in Nigeria is peculiar and largely driven by informal sector activities. A major factor that is responsible for failure of functional land use planning in the country is non-consideration of the peculiar nature of land use dynamics in physical development policy. The study recommended, among other things, the integration of the peculiar nature of land use dynamics in urban land use plans in Nigeria.

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