

Determinant of Urban Growth in Potiskum Town

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Abstract

Growth has been the characteristics of cities and towns in the developing world, taking over major fragment of non-built-up area within the urban centers. Therefore, requires proper and effective analysis. This study focused on the determinant of urban growth in Potiskum LGA of Yobe state, Nigeria using qualitative techniques to examine the determinants and effects of the spatial growth of Potiskum LGA. Data on the determinant and the effects of the spatial growth of Potiskum LGA was derived using question and Relative importance index (RII) was used to analyze and ranked the perception of respondents. Findings of the RII on the determinant and effects of the spatial growth of Potiskum LGA revealed that increase in population is the major determinant of the growth of the built-up land-use of the study area while increase in the cost of land within the LGA being the most influenced factor as a result of the spatial growth of the LGA. The study recommended that both state and federal Government should adopt and enforce integrated spatial techniques in monitoring and controlling urban growth, improved rural programs should be embarked so as to reduce rural-urban migration as well as intensified awareness on the importance of birth control.

Keywords: Urban Growth, Urbanization, Spatial Growth, Urban, Relative Important Index.

Introduction

The concept of urban expansion change is defined as the loss of natural areas, particularly loss of forests to urban or exurban development, or the loss of agricultural areas to urban or exurban development, (Anthropocene, 2018). Land use change may be grouped into two broad categories as conversion and modification. Conversion refers to changes from one cover or use type to another, while modification involves maintenance of the broad cover or use type in the face of changes in its attributes (Baulies and Szejwach, 1998). Land use and land expansion change science were proposed to better understand the anthropic impacts on the earth systems through changes in land management and to observe such changes by satellite imagery, by studies of drivers and impacts and by modeling the processes of land change, looking to provide a better picture of the land transition dynamic and scenarios for future changes (Robinson et al., 2013). Furthermore, land change science is linked to studies and estimates of Green House Gas emissions, as changes in land cover led to alterations in soil properties and consequently to changes in nutrient dynamics, which are responsible for gaseous fluxes.

Urban growth implies a continuous growth of the human population, activities and a corresponding expansion of infrastructures that extend to the areas surrounding these cities (Barry and Haach 2006). Offiong and Eteng, (2014) viewed urban growth as the expansion of the urban area outside its borders into the suburbs. Gordon and David (2014) also viewed urban growth as broad-based rural-to-urban transition involving population, land use, economic activity and culture, or indeed any one of these. Thus, it is frequently used to refer to changes in land-use for specific areas (usually on the

periphery of urban concentrations) as this land becomes 'urbanized' and is sold and developed for urban use (e.g., the sale of plots for housing). Urban growth has been the characteristics of cities and towns in the developing world, seceding major fragment of non-built-up area within the urban centres. In the past few decades, urban growth has drastically accelerated in many developing countries. United Nations report on the prospect of urbanization indicated that the percentage of world urban population in 1950 was 30 % which increased to 54 % in 2014 and estimated to be 66 % by 2050. In Africa, the urban population is expected to triple from 414 million in 2011 to 1.2 billion by the year 2050 (United Nations, 2014).

Naab (2012) was of the view that rapidly increasing urban population means changes in economic, social, spatial, and environmental issues for the improvement of society. According to Barros (2004), the rapid growth and expansion of urban centers results to scarcity of land. The rapid changes of land use than ever before, particularly in developing nations, are often characterized by rampant urban sprawling, land degradation, or the transformation of agricultural land to shrimp farming ensuing enormous cost to the environment (Sankhala and Singh, 2014). As the cities expand, the main zone of direct impact is the peri-urban area (Nsiah-Gyabaah, 2000), which are characterized by diverse uses of land, that often vary in relation to their functional linkages to urban and to rural sectors. This kind of changes profoundly affects local and/or regional environment, which would eventually affect the global environment.

Potiskum which has been a thriving trade hegemony in Yobe State because of its strategic position as a center of commerce, learning, spiritual and cultural revival over the years have witnessed observable urban growth and expansion, noticeably the built-up area which burst outward in an explosion of growth that consumed former agricultural land at a break-neck pace (Hassan, Hassan and Jambo, 2021). Thousands of hectares of agricultural land are covered by concrete and asphalt as new roads are created and existing ones are extended. The urban areas in Yobe state will increase from 54km² in 2009 to 99 km² in 2030 while built-up will increase from 23km² in 2009 to 47km² in 2030 (Hassan, Hassan and Jambo, 2021). Despite the environmental, social and economic implications associated with urban growth at global, regional and local level none of the previous studies focused perceived determinant of urban growth in potiskum LGA of Yobe state Nigeria. Thus, this study will examine the determinant of urban growth and assess the effect of urban growth in the study area.

Statement of Research Problem

The earth surface is experiencing rapid urban expansion changes as a result of many humans induces forces and natural factors/phenomena. Urbanization is a major problem of concern with respect to global environmental changes. The rapid growth and expansion of Potiskum town, rapid population growth, scarcity of land, the need for more production, changing technologies are among the many drivers of Spatio-temporal expansion in the Potiskum town today. According to Jajere et al, (2014), urban expansion responds to socioeconomic, political, cultural, demographic and environmental conditions and forces which are largely characterized by high human populations. Urbanization has become one of the major concerns of researchers and decision makers around the world today.

The notion of developed and developing countries is not crucial regarding the effect of unhealthy urban growth, which they ultimately limited to the region land use mainly resulting in loss of prime agricultural lands and water bodies, which Sudhila (2004) considered as endemic phenomena, which an impact on the structural growth of any city or towns. As the structure of urban growth has an

impact on urban socio-economic activities and ecosystem, the (WUF 6, 2010) dialogue 3, calls on urban planning authorities to encourage more compact urban development, to a high build-up density in order to take advantage of agglomerate economies which is crucial catalyst to the city's prosperities. Sustainable land management and urban development planning required a scientific understanding of complex growth pattern and process (Jianguan, 2003), which is possible using Remote Sensing and Geographic Information System.

Urban growth is largely based on important event that take place based on the transition, thus not all transition that may or may not happen at every time steep. It's an established fact that urbanization in Nigeria is largely based on government policies derived via state and local governments' creation where the new states and local government headquarters become migration pulls (Daura *et. al.*, 2006).

Potiskum town is among the most developing town in Yobe states since before the emergence of Damaturu as a state capital after the Yobe state created in Nigeria in 27 August 1991. Since then, Potiskum is developing speedy structurally and functional dynamics. It is an established fact that each and every town/city has its own unique growth experience. Potiskum is at its infant growth stage, therefore these rapid changes need to be understood in terms of rate, pattern and degree of environmental and socio-economic functional changes, in order to avoid wrong decisions, enhance effective planning, land management, avoiding some major urbanization problems and plan for growth.

Despite the environmental, social and economic implications associated with urban growth at global, regional and local level none of the previous studies focused on the resultant effect of urban growth on the population also no study has been carried out in Potiskum LGA using Shannon Entropy model to determine the pattern of urban growth in the study areas. These are the gaps in knowledge that the present study intends to fill. In view of this, the study will answer the following research questions:

- i. What are the determinants of the spatial growth of the study area?
- ii. What are the effects of the spatial growth of the study area?

Aim and Objectives of the Study

The aim of the study is to analyze the spatio-temporal growth of Potiskum LGA. The aim will be achieved through the following specific objectives; which are to:

- i. examine the determinants of the urban growth of the study area and
- ii. assess the effects of the urban growth of the study area

Literature Review

Several studies have been conducted on the issue of urban expansion, for example, Sewunet (2017), analyzed urban sprawl and landuse change detection using Remote sensing and spatial tools in Addis Ababa city. The study made use of Landsat images and pan sharpened (fused) with SPOT-5 (5m) using hyperspectral color merging algorism to get better images with 5m spatial resolution. The satellite images were classified and analyzed using maximum likelihood of supervised classification method. The change detection analysis results indicated that Addis Ababa is growing rapidly with an average rate of 5% per year for the past 32 years from 1984–2016. The results showed that the built-up area constituted 15% (1984), 19.6% (1995), 27.5% (2006) and 47.5% (2016) in the study area.

Oyegun, Umeuduji, Abali and Abua (2016) examined Landuse/Land cover Dynamics along Calabar River Catchment (1980 - 2010). The study made use of Geographic Information System (GIS)

analysis. Result of the study showed that urban and farm land use types encroached grassland, forest, bare land and water body by 17.54% and 13.59% respectively and reductions in grassland 12.01%, forest 11.01%, bare land 4.62% and waterbody 3.5%.

Offiong and Eteng (2014) studied the effect of Urbanization on green areas in Calabar Metropolis. The study made use of Remote Sensing and Geographic Information Systems (ArcGIS 9.3 software) for the change detection analysis. The Result of the study revealed that there was an increase in the amount of urban developed areas from 80.96 sq. km in 2004 to 111.26 in 2009 and 125.125 in 2012, which shows that total of 44.165 sq.km of urban green areas have been lost to built-up areas. This implies that forested lands are being converted to other land use which is as a result of the growth on the LGA.

Study Area

Potiskum LGA lies between Latitudes 4°54' 00" N to 5°04' 00" N of the equator and Longitudes 8°18' 00" E to 8°24' 00" E of the Greenwich Meridian (Figure 1.1). It is bounded by Nangere LGA to the north, Fune LGA to the east and south and Fika LGA to the west. The LGA covers a land area of 559 square kilometres (Daura *et. al.*, 2006). The climate of the state is heavily subjective to the comparatively stable tropical continental air mass that originates from the Sahara Desert and conveys the dusty northeast winds. The dryness lasts for almost seven months annually with a severe cold and harmattan which is characterised by a precarious atmospheric condition known as harmattan. Hot climate starts around March through to May/June when the rains set in. The range of the annual rainfalls in the state between 100mm/400mm in the northern to about 700mm in the southern part. The duration of the rainy season lasts for 3-4months starting from May/June to about September/October (Okupe, 2002). The study area is also part of the open plain developed on young sedimentary rocks of Chad formation, which is made up of clay and horizons the basin averages depression is between 45-75 metres and separated from Benue valley by Biu plateau (Okupe, 2002). The topography of the town is flat with open valleys running on a north-south west axis through the town during the rainy season this act as stormy water drainage flowing to the north – east (El-idrisi, 2000). Water divided is found about few metres below in the area. The vegetation is generally characterised by Sudan Savannah Grassland on the southern part while Sahel savannah southern part.

The vegetation is dense in the southern part comprising patches of taller trees and long grasses while on the other hand, the northern part which grasses characterise Sahel Savanna, with some sparse dwarf and stunted trees and shrubs are the most common vegetation features of the state (Valla & Ayoola, 2014; WFP, 2016). The LGA's economy is a combination of primary, secondary and tertiary activities. There is cultivation of staples such as guinea corn and millet, and cash crops such as cotton, groundnut and beans as primary activities. As reported by the National Population Commission, the total population figure of the study area is about 205,876. However, considering its high population growth rate estimated at 3.2% per annum, the population of the study area must have risen to about 298,516 in 2021. The main tribes in the study area includes Kare-Kare, Fika, Bolewa and Ngizim.

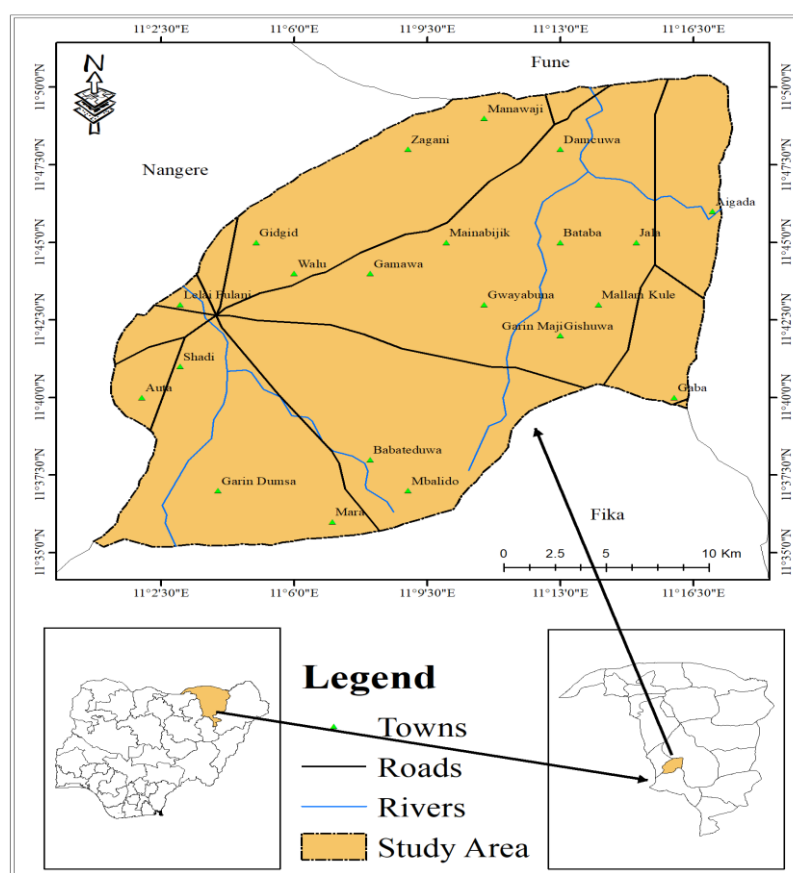


Figure 1.1: Map of the Study Area

Source: Adapted and Modified from Administrative Map of Potiskum LGA

Materials and Method

The data used for this study were obtained from both primary (questionnaires on determinant and effects of urban growth) and secondary sources (administrative map). The questionnaire was administered to 384 respondents in the study area. The copies of questionnaire was administered to ascertain the determinants of urban growth and the effects of urban growth in the study area. The sampling of respondents was done by using purposive sampling technique. This was achieved by going from house to house within each ward and respondents who have lived for at least 30 years was sampled. The reason for this is because only respondents that have been residents for 30 years and above can provide adequate information on the study area for the year under study. However, the administrative map of the study area (1:50,000) was acquired from the Ministry of Land and Survey, Yobe State and used as the base map for the study. To analyse the data obtained, descriptive statistics like frequency and percentage and also Relative Importance Index (RII) was used to analyze and rank the responses on the determinants of urban growth and effect or growth.

Result and Discussion

Demographic and Socio-Economic Characteristics of Respondents

The sex, age, marital status, occupation, education and average monthly income of respondents in Potiskum LGA are presented in Table 1.1. Table 1.1 revealed that out of the 384 sampled population,

78.7% were male and 21.3 percent were female. This shows that more males were contacted to respond to the questionnaire as women had limited time to respond owing to the nature of their activities such as domestic chores. The patriarchy nature of the northern Nigeria could also be one of the reasons why they are more male than females. It is also obvious from Table 4.4 that 28.4% of the respondents falls within the age range of 40-44 years, followed by the age range of 35-39 years with 22.6%, while the age range of above 60 years had the least number of respondents with 9.1%. This is due to the fact that the targeted sampled population were those that must have been of age 30 years and above in the study area. The implication of this is that the study area has population composed of youths and vibrant adults and has a clear picture of the growth of the LGA. The result on marital status of respondents revealed that 54% of the respondents are married while 5.2% were divorces.

The result on the occupation status of respondents established that most of the respondents in the study area are businessmen and women which accounts for 39.8% of the total number of respondents while civil service accounts for 25.5%. This shows that Potiskum truly is a business and administrative area. The economic and administrative characteristic of Potiskum LGA is due to the fact that it is the commercial center of Yobe state. The result on education status of respondents revealed that literacy level is generally high in the study area as seen in Table 4.5 where only 2.1% had informal education, while others had different level of formal education with 54.4% of the respondents having tertiary education. It is worthy of note that the study area was one of the first city to have contact with the Europeans and education in northern Nigeria.

Table 4.4: Demographic and Socio-Economic Characteristics of Respondents

	Frequency	Percentage
Sex		
Male	302	78.7
Female	82	21.3
Total	384	100.00
Age (Years)		
35-39	87	22.6
40-44	109	28.4
45-49	67	17.4
50-54	41	10.6
55-59	46	11.9
Above 60	35	9.1
Total	384	100
Marital status		
Single	98	25.5
Married	207	54
Divorced	20	5.2
Separated	27	7
Widowed	32	8.3
Total	384	100
Education		
Informal	8	2.1

Primary	36	9.4
Secondary	131	34.1
Tertiary	209	54.4
Total	384	100
Occupation		
Industrial Workers	80	20
Farming	40	10.4
Civil Service	98	25.5
Business	153	39.8
Student	13	3.4
Total	384	100
Average monthly Income		
Less than 20000	64	16.7
20000-39999	77	20
40000-59999	101	26.3
60000-79999	84	21.9
Above 80000	58	15.1
Total	384	100

Source: Author's Analysis, (2019)

This is evident in the establishment of one of the first airport in northern Nigeria. The airport came into being during the scramble for Africa by the colonialist because Potiskum was a sprawling town in the north which was earlier annexed by Germany before the United Kingdom took over. The aim of constructing the airport was to make the movements of the white men in and out of Potiskum easy because the town was also the gateway to other nearby towns in the north, which had enhanced trading activities and other associated commercial services in the region and therefore literacy level is expected to be high (Ola 2000). Lastly the result on the average monthly income of respondents shows that majority of the respondents earns, 40000-59999 naira which accounts for 26.3% while a fraction earns below 20,000 naira that represents 16.7% of the total respondents. This implies that most of the respondents earned above the old national minimum wages of 18,000 naira. The income level of the respondents depicts the possibility of building more houses and setting up other business ventures which are indices of urban growth.

Determinant of the Spatial Growth of Potiskum LGA.

The results of the *R/I* on the determinant of the spatial Growth of Potiskum LGA is presented in Table 1.1

Table 1.1: *R/I* on the Determinant of the Spatial Growth of the Study Area

Factors	Rating (W)					$\Sigma W*N$	<i>R/I</i>	RANK
	1	2	3	4	5			
Presence of social Amenities	3	4	8	109	260	1771	0.922	6 th
Topography	0	6	17	135	226	1734	0.903	7 th
Presence of Tertiary institution	0	0	15	81	288	1809	0.942	4 th

Creation of Satellite towns	0	0	0	69	315	1851	0.964	2 nd
Tourism	0	0	9	53	322	1849	0.963	3 rd
Availability of Industries	0	10	18	59	297	1795	0.934	5 th
Population Increase	0	0	9	25	350	1877	0.977	1 st
Access to Health Facility	0	4	66	181	133	1595	0.830	8 th

Source: Author's Analysis, (2021)

The ranking of the determinant of the spatial growth of Potiskum LGA was computed and shown in Table 1.1. It was observed that the 384 of the respondents stated that the spatial growth of Potiskum LGA is being influenced by some of the factors in Table 1.1. With regards to the factors responsible for the growth of Potiskum LGA. Population increase had the highest ranking (1st) which suggests that it is the most significant factor that is influencing the spatial growth of the study area. Access to health facility had least ranking of 8th, topography had a ranking of 7th and both tourism and creation of satellite towns was ranked 2nd and 3rd respectively, However, increase in the number of industries was ranked 5th while presence of social amenities was ranked 6th. This agrees with the findings of the in-depth interview conducted which suggested that increase in population is the major determinant of urban growth where all the interviewees unanimously quoted population increase as the major determinant of the spatial growth of the study area. This result agrees with the findings of Ade and Afolabi (2013) who in their study identified that population dynamics are the underlying drivers of development and environment changes in any city.

However, the result from the interview conforms with land use land cover analysis which showed that built-up has consumed a substantial part of other land use in the study area. This is as a result of the increase in population. Because land scape transformation in urban environment throughout space and time are mainly dominated by anthropogenic activities and are greatly influenced by the spatial expansion of built-up land.

Effect of the Spatial Growth of Potiskum LGA

The results of the RII of the perception of respondents on the effects of the spatial growth of Potiskum LGA is presented in Table 1.2. The data in Table 1.2 is the output of the ranking of the RII of the effect of the spatial growth of Potiskum LGA. Results revealed that out of the 384 respondents 268 of the respondents stated that the spatial growth of the study area possess some effects on the LGA. Increase in the cost of land within the LGA had the highest mean ranking of 1st which suggests that it is the most significant factor that on the effect of the growth of the LGA. Conversion of farm lands to residential within and at the fringes of the study area was ranked 10th, high rate of crime and conversion of urban fringes to urban area were ranked 5th, while forest depletion at the fringe of the LGA had a ranking of 7th, environmental pollution was ranked 8th, pressure on road was ranked 9th and poor state of housing had a ranking of 6th.

Table 4.10: RII of the Effects of the Spatial Growth of Potiskum LGA

	Rating (W)							
Factors	1	2	3	4	5	$\Sigma W*N$	RII	RANK
Availability of skilled jobs		4	6	105	250	1702	0.925	4 th
	2							
Conversion of urban Fringes to urban area		2	30	105	229	1660	0.902	5 th
	2							
Conversion of Farm lands residential within and fringes of the LGA	0	2	25	220	121	1564	0.850	10 th
Forest depletion at the fringe of the LGA	0	17	21	114	216	1633	0.887	7 th
Environmental pollution	1	13	26	113	215	1632	0.886	8 th
High rate of crime	0	5	23	118	222	1661	0.902	5 th
Pressure on road	2	5	33	132	196	1619	0.879	9 th
Poor state of housing	0	3	38	119	208	1636	0.889	6 th
Pressure on land within the LGA	0	0	0	115	353	1725	0.937	2 nd
Increase in the cost of land within the LGA	0	0	3	107	258	1727	0.938	1 st
Increase in the cost of house rent	0	0	31	64	274	1715	0.932	3 rd
Erosion/Deforestation	9	25	58	130	147	1488	0.808	11 th
Traffic congestion within the LGA	1	7	121	129	96	1388	0.754	12 th
	5							

Source: Author's Analysis, (2021)

Interestingly, increase in the cost rent was ranked 3rd and pressure on land within the LGA has the second highest ranking of 2nd and availability of skilled job had a ranking of 4th while erosion/deforestation and traffic congestion within the LGA had a ranking of 11th and 12th respectively. The figures revealed that the growth of Potiskum LGA has high influence on all of the factors. The result agrees with the findings of Joseph, Raphael and Hubert (2014) which revealed that the urban infrastructures such as roads/streets, electricity, water supply system and waste management system are depreciating and this has compounded the way the cities are sprawling far beyond the range for which the facilities were planned and projected.

Conclusion

The study analysed the determinant of urban growth in Potiskum LGA, Yobe state Nigeria and qualitative techniques were adopted to examine the socioeconomic characteristics of respondents, determinants and effects of the spatial growth of Potiskum LGA based on the findings of the study,

it was observed that increase in population was seen to be the major determinant of the spatial growth of the study area while increase in the cost of land has been highly influenced by the spatial growth of the Potiskum LGA.

Recommendation

In line with the findings of this study, the following recommendations are made;

- The Yobe State Government through the relevant authorities should embark on a regular appraisal on the spatial growth dynamics and pattern of the LGA using remote sensing and geospatial techniques in order to curtail the haphazard and illegal construction of buildings within the LGA.
- Improved rural programs should be embarked by the Yobe state government so as to reduce rural-urban migration as well as intensified awareness on the importance of birth control.

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