

Spatial Distribution Pattern of Commercial Facilities in Adamawa State, Nigeria

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Abstract

In regional studies, flourishing commercial activities and facilities are crucial to socio-economic and regional development. However, studies have shown that spatial inequalities in the spatial distribution pattern of facilities hinder development and lower the living standard. Therefore, this study assessed the spatial distribution pattern of commercial facilities and the effect of the spatial distribution pattern on community development and quality of life in Adamawa State. Consequently, questionnaires were used to seek secondary data on the spatial distribution pattern of commercial facilities from secondary sources (both local and state government ministries and boards) in the state. The collected data were subjected to descriptive and inferential statistics. The spatial concentration map of commercial facilities in the study area was generated through geospatial techniques. The result of the study revealed an inadequate and unequal spatial distribution pattern of commercial facilities in Adamawa State. Recommendations on the need to formulate and implement policies that will boost commercial development in the state were made.

Keywords: Spatial Pattern, Commercial Facilities, Industrial Development, Location Quotient, Socio-Economic Development.

Introduction

Commerce and trade are important means of regional development and livelihood. Regional development studies have shown the influence of commerce and trade on the development of emerging countries. According to Karimo, Krokeyi, and Ekainsai (2016), no country is completely self-sufficient in terms of commodities and services; hence, trade has consequently come to be accepted as the norm in the global economy. David (2010) argues that trade helps countries achieve their macroeconomic goals, such as high employment, the redistribution of wealth, and economic stability. However, to attain sustainable trade and regional development, adequate provision of commercial facilities such as banks, markets, and industries is important.

For instance, banks provide financial services for businesses, enhance productive activities and development, and ensure national economic growth and development (Ayadi et al., 2008; Somasundaram, 2020). Likewise, markets increase access to healthy foods, honour historical legacies, and highlight the local culture of communities; they bring community members and local business leaders together (American Planning Association [APA], 2015). Also, Morales (2009) submitted that markets help in place-making, employment

generation, and social, political, and economic purposes. As well, industries of all kinds (extraction, manufacturing, and agriculture, among others) play vital roles in the development of countries (Anjorin et al., 2017). These facilities aid in the process of change or improvement in the social and economic conditions of individuals, organizations, or societies (Roztocki et al., 2019). Not only do these facilities influence the living standards of people, but they also positively impact the development levels of communities and nations. Consequently, accessibility and a balanced spatial distribution pattern of these facilities across regions are as crucial to regional development as their adequacy. However, studies including Szakalne and Vas (2013), Islam (2017), and Ansong et al. (2015) revealed that the spatial distribution patterns of commercial facilities are often unequal. For example, Szakalne and Vas (2013), in a study to identify the spatial coherence and concentration of knowledge-intensive industries at the subregional level in Hungary, reported a mixed picture in terms of geographical concentration and spatial agglomeration of industries. Also, a high concentration of industries in urban centers was reported in Beijing, China (Jiaming et al., 2015). Similarly, Islam (2017), in a study on the spatial distribution pattern of market centers in Rangpur City Corporation, Bangladesh, reported a high concentration of market centers in Rangpur's center and residential areas. In addition, Ansong et al. (2015) reported that banks are more concentrated in Ghana's south than in its north. The consequence of the unequal spatial concentration pattern of banks in Ghana is that residents of the southern part of Ghana have more access to financial services than their northern counterparts.

As well, both economic and geographic studies were conducted on trade and regional development in Nigeria. Some of the economic studies on the subject are captioned: "The effect of international trade on Nigerian economic growth (David, 2010); factors influencing Nigeria's trade (Karimo, Krokeyi, and Ekainsai, 2016); and what determines economic growth in Nigeria?" (Nyoni and Wellington, 2018). On the other hand, a few of the geographic studies on regional development in Nigeria include: the spatial relationships between the location of microfinance banks and poverty in Nigeria (Abubakar, et al, 2015); airport development and socio-economic development in Nigeria (Aun, 2013); and markets and marketing systems in Nigeria (Galtima Mubi & Anjorin, 2020), among others. However, like in other regions of the world, inequalities in the spatial distribution pattern of commercial facilities were reported in Nigeria.

The Concept of Spatial Pattern

Various geographic features, including humans, water bodies, settlements, social facilities, and economic activities, exist in spaces. These geographic features have both absolute and relative locations. While some are close, others are far apart. However, regardless of their relative or absolute locations, there is interconnectivity and linkage between spatial features. Hence, in order to study geographic features within physical areas and to comprehend their linkages and interconnectivity, knowledge of the spatial distribution

pattern of geographic features becomes handy. Accordingly, the spatial distribution pattern, which has been variously defined, is an important tool in understanding the spatial processes behind the spatial pattern of phenomena and in analysing the development processes of geographic issues. According to Muscat (2021), spatial distribution studies the physical location of things, including human lives, within physical spaces and enables understanding their relationships and interconnectedness. That is, the placement of distinct things in space and the geographic connections between them define the spatial distribution pattern (Chou, 1995). Industrial location, spatial changes and trends, socio-economic facilities, development, and people, among others, have spatial patterns.

Many studies have examined the spatial patterns of geographic phenomena in different parts of the world. A few of such studies include Ujoh and Kwaghsende (2014), Umoren (2013), Ibor and Atomode (2014), and Usman (2014). Others include Jiaming et al., (2015), Mansour (2016), and Tali, et al., (2017), among others. These several studies looked at socioeconomic development disparities across geographical units (in Akwa Ibom State, Nigeria), health service features and use (in Calabar Metropolis, Nigeria), and the spatial pattern of rural road transport (in Kwara State, Nigeria). Others include the geographical distribution of medical facilities in Beijing, China; knowledge-intensive enterprises in Hungary; and the Pulwama district of India. In addition, regional development and income distribution inequality, transport planning studies for socioeconomic development (particularly for the downtrodden sub-regions), and the causes of the spatial variations in economic development all benefit from the use of spatial pattern analyses. Spatial distribution patterns also aid in the analysis of economic growth, barriers to regional development, sectoral structural inequalities, and spatial policy.

Statement of the Problem

Ascertaining the spatial distribution pattern of socio-economic facilities is crucial to community development and the living standards of residents of any community. The balanced spatial pattern of such facilities makes life easier and more comfortable. However, inequalities in the spatial distribution patterns of commercial (and other socio-economic) facilities have tremendous negative effects on regional and community development. Inobeme and Ayanwale (2009) and Ujoh and Kwaghsende (2014) described the unequal spatial distribution patterns of such facilities as a potential impediment to community development and living standards. Spatial inequalities can raise poverty levels and trigger dissension among communities and regions; they can also make accessing banking services, markets, or the buying of industrial finished goods more costly (Mansour, 2016; Umoren, 2013). But despite the negative effects of the inequalities in the spatial distribution pattern of socio-economic (including commercial) facilities on communities, regional economies, and sustainable development, there is not much scientific data on this subject in Adamawa State. Therefore, the dearth of scientific data on the spatial distribution and

concentration pattern of commercial facilities in the study area formed the basis of this study.

Aim and Objectives

This study aims to assess the spatial distribution pattern of commercial facilities with a view to understanding their effects on socio-economic development and the living standard in Adamawa State. To that effect, the specific objectives of the study are to:

- examine the spatial pattern (distribution and concentration) of commercial facilities in the study area
- analyze the effects of the spatial pattern of the assessed commercial facilities on the development of the state, and
- map the spatial concentration pattern of commercial facilities in Adamawa State.

Material and Method

Study Area

Adamawa State lies within latitudes $07^{\circ}15'$ and $10^{\circ}58'N$ and longitudes $11^{\circ}29'$ and $13^{\circ}47'E$ and occupies $37,852.33\text{km}^2$ total land area (Adebayo, 2020 and Zemba et al, 2020). To the north, west, south-west, and east of Adamawa State lie Borno State, Gombe State, Taraba State, and the Republic of Cameroon, respectively (Fig. 1.1).

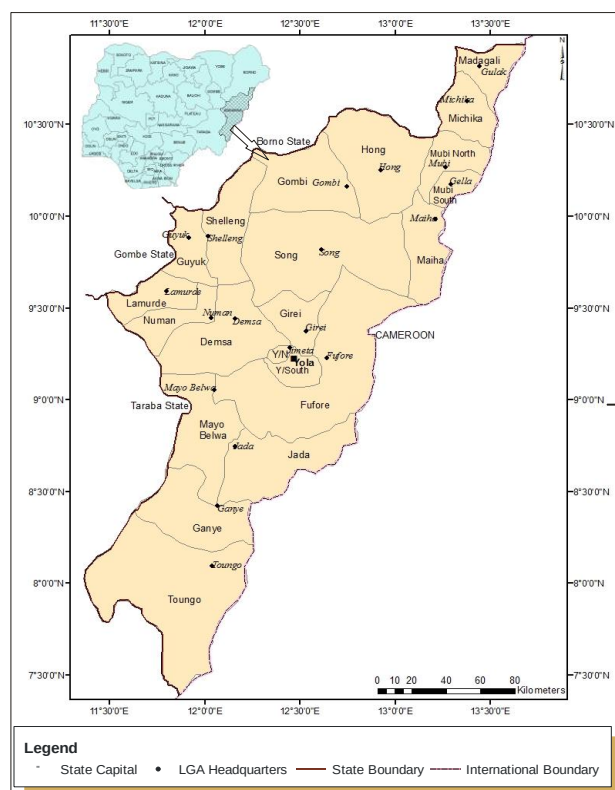


Fig. 1: Adamawa State showing LGAs and their capitals

Source: Anjorin et al (2021)

The state has wet and dry seasons (from April to October and from November to March, respectively) and a monthly mean temperature range of 26°C to 29°C in different parts of the state. There are two dominant vegetation zones: Guinea Savannah and Sudan Savannah, as well as four drainage networks in Adamawa State (Rivers Benue, Yedzeram, Taraba, and Hawul) (Adebayo and Zemba, 2020; Ikusemoran et al., 2018; and Adebayo and Umar, 2020). Adamawa State's population as of the year 2017 was 4,470,434 with over 70 ethnic groups (Anjorin et al., 2021; Fakuade, 2020). Most of the state's residents are into farming, including crop production, animal rearing, and fishing (Kadams et al., 2020). Other occupations in the state are civil service, trading, transportation, woodcarving, and pottery (Adamu et al., 2020; Adewusi & Anyanwu, 2020; and Sahabo, 2020). Mineral resources such as clay, kaolin, limestone, glass sand, and magnesite abound in different parts of the state. Also, socio-economic facilities including inter- and intra-roads, electricity, healthcare centers, institutions of learning (universities, polytechnics, and colleges), security formations, airports, and markets are in Adamawa State (Dasin et al., 2020). The spatial distribution pattern of these geographic elements can prove significant for regional development.

Methods

The spatial pattern of three commercial facilities, namely banks, markets, and industries, in Adamawa State was examined. Secondary data collected for the study covers only the available commercial facilities in Adamawa State as of January 2019. The information gathered includes the number of facilities in each LGA. The industries assessed in the study were divided into four categories: mining, manufacturing, agro-processing, and local craft. The mining industry includes all types of mining and quarrying. While manufacturing industries produce finished industrial goods, agro-processing industries process raw materials or products derived from the agriculture sector. Also, the local craft industry is involved in crafting materials such as mats and ropes. The 2006 National Population and Census Figure was obtained, projected, and used for the study. Secondary data used for the study were obtained from the commercial departments of each of the 21 local government secretariats in the state: the Adamawa State Ministry of Commerce and Industry and the National Population Commission office, Yola.

Instruments used for data collection are questionnaires and photographs. The questionnaire was divided into two parts. The first set of questionnaires, with 21 items, was designed to seek information on the availability, quantity, and location of commercial facilities in each local government area, while the second set of questionnaires was for the state Ministry of Commerce and Industries. Also, relevant literature was reviewed, and data was summarized and coded using Microsoft Excel (2010 version). Subsequently, a descriptive statistic was used to determine the quantity of each commercial facility in each LGA.

To determine the spatial distribution pattern of the accessed commercial facility, the numbers of each facility in all local government areas were added. On the other hand, a location quotient statistical test was performed to determine the spatial concentration pattern of the assessed commercial facilities in the state. According to Balogun (2018), the spatial concentration pattern of socio-economic facilities in an area can be determined using the location quotient (LQ) technique. Less than one (1) indicates a lack of facility(ies), more than one (1) indicates a surplus of facility(ies), and one (1) indicates a moderately provided facility (Tali, et al., 2017). Accordingly, Adamawa States' LQ average value was the basis for comparing the spatial concentration pattern of the assessed commercial facilities in each LGA and the state. Based on the state LQ average score, the state was classified into three classes (low, moderate, and high) and mapped using the ArcGIS 10.5 module that combines the descriptive statistics of LQ values for the classification and mapping. Hence, the geospatial technique applied to generate the spatial concentration map for the study. The formula for location quotients is:

$$LQ_i = \frac{e_i/e}{E_i/E} \text{ (Balogun, 2018 \& Anjorin et al, 2021).}$$

Where,

LQ_i = Location quotient for facilities for the Local Government/State.

e_i = The total number of facilities in the Local Government i ;

e = Total number of facilities in the State;

E_i = Population of the Local Government i ;

E = Total population of the State.

Result and Discussion

Spatial Pattern of Commercial Facilities

Every community, state, and nation relies on commerce and trade for socioeconomic development. It creates employment, generates income for people, and causes an improvement in their living standards. Hence, data on the spatial distribution pattern of commercial facilities in Adamawa State was assessed, and the results are presented in Table 1.

Table 1: Descriptive Analysis of the Distribution Pattern of Commercial Facilities in Adamawa State

L.G.As	Population	Banks	Markets	Industries			
				Mining/Quarrying	Manufacturing	Agro-processing	Local Craft
Demsa	254,348	3	2	1	0	0	4
Fufore	292,497	2	10	1	0	0	5
Ganye	231,539	5	6	0	0	2	6
Girei	183,432	4	3	0	1	2	3
Gombi	206,622	2	4	0	0	2	3
Guyuk	250,868	2	5	0	0	2	3
Hong	238,649	2	9	0	0	3	5
Jada	237,728	1	6	1	0	3	3
Lamurde	159,173	2	3	0	0	1	3
Madagali	190,251	0	5	1	0	2	3
Maiha	156,932	1	6	0	0	2	3
Mayo-Belwa	216,076	2	3	1	0	1	3
Michika	219,143	3	3	0	0	2	3
Mubi-North	213,174	2	12	0	0	2	4
Mubi-South	181,940	6	9	2	0	2	4
Numan	128,017	3	5	0	0	0	4
Shelleng	210,347	1	5	0	0	2	3
Song	271,910	1	8	1	0	2	4
Toungo	73,432	1	2	2	0	0	3
Yola-North	279,741	25	3	0	3	3	4
Yola-South	274,605	5	3	3	0	3	4
State Total	4,470,434	73	112	13	4	36	77

Sources: Field Survey (2018)

Table 1 shows spatial inequality in the distribution pattern of commercial facilities in Adamawa State. For instance, there are 73 banks, 112 markets, and 13 functional mining and quarrying sites. Out of the 73 banks in Adamawa State, 25 Banks are in Yola North LGA, and distantly followed by Mubi South LGA with 6 banks, and Ganye and Yola South LGAs with 5 banks in each. Five LGAs, namely Jada, Maiha, Shelleng, Song, and Toungo LGAs, have one bank each, while Madagali LGA has none.

Also, in terms of market distribution, although the spatial distribution pattern of the 112 markets in Adamawa State appears to be relatively balanced, a few LGAs are more favorably situated. Mubi North, Fufore, Hong, and Mubi South LGAs have the highest number of markets in the state, ranging between 9 and 12, whereas Demsa, Girei, Lamurde, Mayo-Belwa, and Michika LGAs do not have more than three markets each. Markets are an important agent of socio-economic development in the state, especially due to their relatively fair spatial distribution pattern. The markets in Adamawa state attract various facilities, such as electricity, security, and improved transportation, to communities in the state. However, the only 13 active mining and quarrying sites in the state are in only nine (9) LGAs: Demsa, Fufore, Jada, Madagali, Mayo-Belwa, Mubi South, Song, Toungo, and Yola South LGAs.

Although Adamawa State is famous for local craft making, the state is not an industrial state. While the state has only four functional manufacturing and 36 agro-processing industries, it also has a variety of local crafts. Among the manufacturing industries in Adamawa State are Faro Water and Beverages Company and Mouka Foam Industry in Yola South and Girei LGAs, respectively. Agro-processing industries in the state include Savannah Sugar Company (Lamurde LGA), rice mills (Mubi North and Jada LGAs), groundnut oil mills (Maiha LGA), and poultry farms in all the LGAs. Local crafts are made in different communities and LGAs in Adamawa State. Girei, Demsa, Ganye, Hong, Michika, Jada, and Numan LGAs are known for weaving baskets, ropes, mats, hats, and fishnets. Canoes, hoes, mortars and pestles, calabashes, and decoration carving are more common in Hong, Michika, Demsa, Ganye, Guyuk, Numan, and Shelleng LGAs. Pottery is more pronounced in Ganye, Hong, Gombi, Maiha, Mubi North, and Mubi South LGAs, while the making of hoes, cutlasses, knives, arrows, and bows (blacksmithing) is more common among the residents of Fufore, Ganye, Jada, Maiha, Mubi North, Demsa, and Numan LGAs. According to Arthur and Sheffrin (2003), industrialization is significant for strong socio-economic development because it aids social and economic change that transforms industrial society. The industrialization progress of any state or country is crucial to its economic development because industries (agricultural, extractive, and manufacturing, among others) are drivers of economic development. Unfortunately, the observed inequality in the spatial distribution pattern of commercial facilities in Adamawa State is a potential promoter of the development dichotomy between communities and regional development inequality.

Concentration Pattern of Commercial Facilities in Adamawa State

Data on commercial facilities in Adamawa State was subjected to Location Quotient (LQ) analysis to determine the spatial concentration pattern of these facilities in Adamawa State, with the results shown in Table 2.

Table 2: LQ Analysis of Concentration Pattern of Commercial Facilities in Adamawa State

LGA	Banks	Markets	Industries				Total	Rank	Class
			Mining sites	Manufacturing	Local craft	Agro-processing			
Yola-North	5.47	0.43	0.00	11.99	0.83	1.33	20.05	1 st	High
Toungo	0.83	1.09	9.37	0.00	2.37	0.00	13.66	2 nd	
Mubi-South	2.02	1.97	3.78	0.00	1.28	1.37	10.42	3 rd	
Girei	1.34	0.65	0.00	6.09	0.95	1.35	10.38	4 th	
Yola-South	1.12	0.44	3.76	0.00	0.85	1.36	7.53	5 th	Moderate
Madagali	0.00	1.05	1.81	0.00	0.92	1.31	5.09	6 th	
Mubi-North	0.57	2.25	0.00	0.00	1.09	1.17	5.08	7 th	
Jada	0.26	1.01	1.45	0.00	0.73	1.57	5.02	8 th	
Ganye	1.32	1.03	0.00	0.00	1.50	1.07	4.92	9 th	
Hong	0.51	1.51	0.00	0.00	1.22	1.56	4.80	10 th	
Numan	1.44	1.56	0.00	0.00	1.81	0.00	4.81	11 th	
Maiha	0.39	1.53	0.00	0.00	1.11	1.58	4.61	12 th	
Song	0.23	1.17	1.26	0.00	0.85	0.91	4.42	13 th	Low
Mayo-Belwa	0.57	0.55	1.59	0.00	0.81	0.57	4.09	14 th	
Fufore	0.42	1.36	1.18	0.00	0.99	0.00	3.95	15 th	
Gombi	0.59	0.77	0.00	0.00	0.84	1.20	3.40	16 th	
Lamurde	0.77	0.75	0.00	0.00	1.09	0.78	3.39	17 th	
Michika	0.84	0.55	0.00	0.00	0.79	1.13	3.31	18 th	
Demsa	0.72	0.31	1.35	0.00	0.91	0.00	3.29	19 th	
Shelleng	0.29	0.95	0.00	0.00	0.83	1.18	3.25	20 th	
Guyuk	0.49	0.80	0.00	0.00	0.69	0.99	2.97	21 st	
State Average	1.00	1.00	1.00	1.00	1.00	1.00	6.00		

Source: Field Survey, (2018)

According to Table 2, banks, manufacturing industries, markets, and other commercial facilities are more concentrated in Girei, Mubi South, Toungo, and Yola North LGAs, but with variation in the concentration pattern of each facility among these four LGAs. For instance, Mubi South has a high concentration of all the assessed commercial facilities except manufacturing industries. Girei LGA has a high concentration of banks, manufacturing, and agro-processing industries, while markets, mining and quarrying, and local crafts are more prevalent in Toungo LGA. The remaining 17 LGAs in Adamawa State have a moderate to low spatial concentration of commercial facilities, with Demsa, Fufore, Gombi, Guyuk, Lamurde, Michika, and Shelleng LGAs having the lowest concentration. In terms of the spatial concentration pattern of markets, Adamawa State, Toungo, and Mubi

South LGAs performed better than Yola North and Girei LGAs with low LQ concentration values that indicate a low spatial concentration of markets. Lamurde, Michika, Demsa, Shelleng, and Guyuk LGAs are the most disadvantaged LGAs in Adamawa State in terms of the spatial concentration pattern of commercial facilities. These five LGAs occupy the 17th through the 21st positions, respectively. However, inequality in the spatial concentration pattern of commercial facilities is not unique to Adamawa State. Abubakar et al. (2015) previously reported inequality in the spatial concentration pattern of commercial facilities in other parts of Nigeria.

Unfortunately, inequality in the spatial concentration pattern of commercial facilities negatively affects community development and the standard of living of residents. For instance, residents of LGAs with low LQ results often don't have easy access to some commercial facilities, especially banks and industries. Hence, residents of Fufure, Jada, Madagali, Toungo, and Shelleng LGAs with a low concentration of banks most often embark on risky journeys to other LGAs for their banking operations. In some cases, a large amount of money that exposed such travelers to armed robbery attacks was withdrawn. This finding agrees with the submission of the Parliament of Australia (2002–04 completed inquiries) that residents of communities without banks are often exposed to armed robbery attacks in the course of their journeys to and from the bank location(s).

Another implication of the inequality in the spatial concentration pattern of commercial facilities in Adamawa State is the low generation of revenue. LGAs with low internally generated revenue would hardly initiate, fund, and provide essential public facilities and services. Hence, LGAs with low revenue would likely not have stable electricity, portable water, adequate security, or efficient public education and health systems.

The relatively high concentration results for agro-processing and low results for manufacturing industries are indications that Adamawa State is more of an agrarian than an industrialized state. As a result, there is bound to be low employment generation in the manufacturing sector in the state. Therefore, the increased unemployment, low level of income generation for individuals and the government, high level of socio-economic underdevelopment, and low standard of living among Adamawa State residents are traceable to the inequality in the spatial distribution pattern of commercial facilities in the state. The spatial concentration pattern of commercial facilities in Adamawa State is shown in Fig. 2.

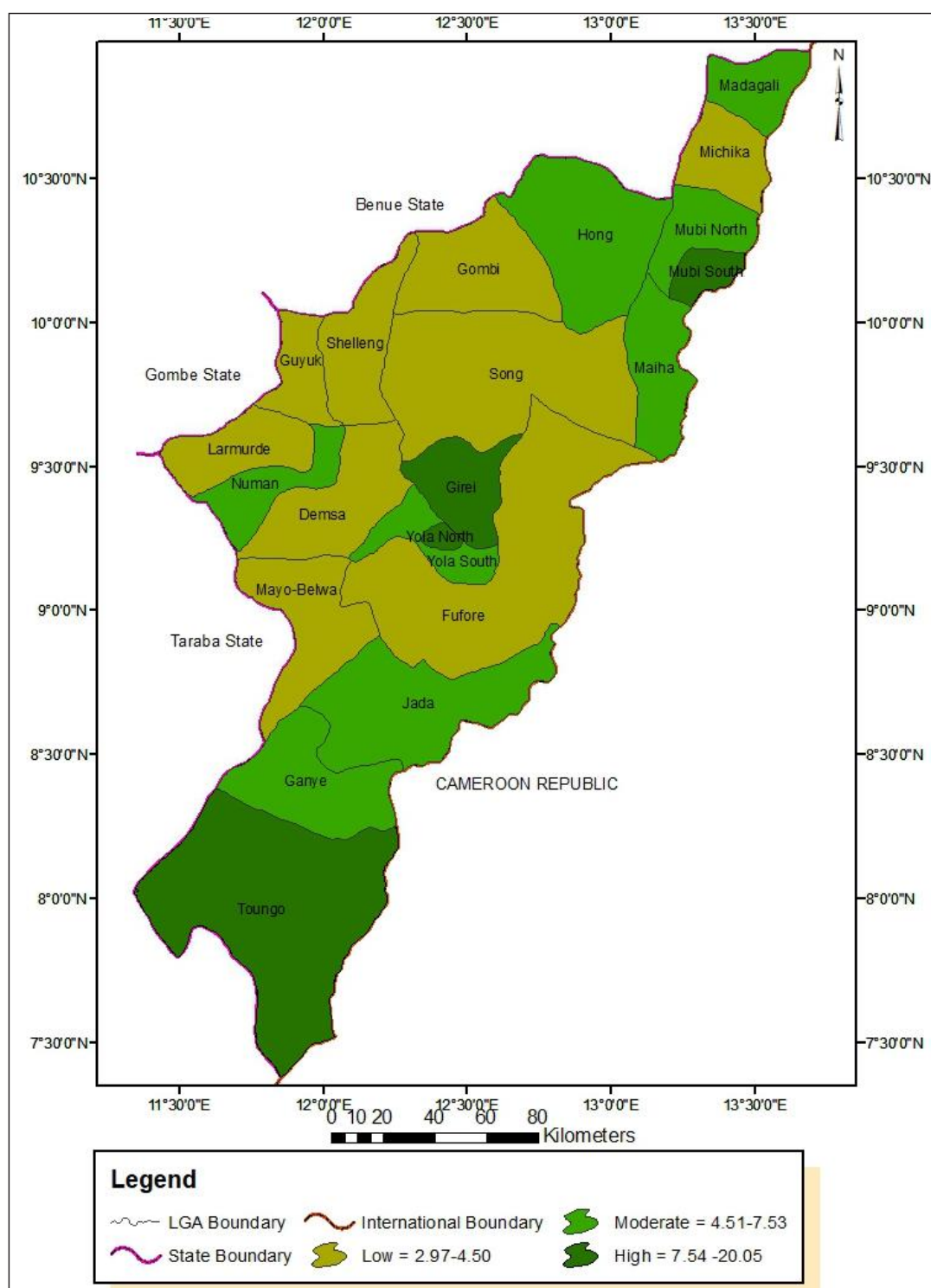


Fig. 2: Spatial Concentration Pattern of Commercial Facilities in Adamawa State

Source: Field Survey (2018)

Conclusion

The focus of this study was to provide quantitative empirical information on the spatial pattern of commercial facilities in Adamawa State. On the spatial distribution pattern of

the assessed commercial and industrial facilities, the descriptive analysis revealed that commercial facilities are more concentrated in a few LGAs, such as Yola North, Mubi South, Mubi North, Fufure, Hong, and Mubi South LGAs, among others. The study further showed that the spatial distribution pattern of the states' population and commercial facilities does not correspond as evidently in highly populated LGAs such as Jada, Mayo-Belwa, Shelleng, and Yola-South, which have fewer banks and markets. Hence, a number of Adamawa State residents are unemployed. Also, the location quotient (spatial concentration) analysis showed a high concentration of banks, manufacturing industries, markets, and other commercial facilities in Girei, Mubi South, Toungo, and Yola North LGAs. The remaining 17 LGAs in Adamawa State have a moderate to low concentration of commercial facilities, with Demsa, Fufure, Gombi, Guyuk, Lamurde, Michika, and Shelleng LGAs having the lowest concentration results. Evidently, the unequal spatial concentration pattern of commercial facilities is detrimental to the socio-economic development of Adamawa State and the living standards of the state's residents.

Recommendations

In accordance with the findings of the study, the following recommendations are made:

- The Adamawa State House of Assembly should devise and implement appropriate policies for the state's industrial and commercial development in order to encourage the state's commercial growth. This specifically entails correcting spatial imbalance in commercial buildings around the state, such as banks, markets, and factories.
- Adamawa State government needs to institute public-private partnerships as a means of stimulating private investments in the establishments of commercial facilities like as manufacturing and local industries, and banks. This would help different worker categories and households by reducing poverty, improving living standards, correcting geographical disparities, and creating job possibilities.
- Priority should be given to location quotient analysis and spatial mapping of commercial facilities before allocating any (commercial) facilities in any communities. This will help to identify the spatial shapes, sizes, available facilities, and support facilities that are critical to their performance within the state as well as reduce or avoid an excessive concentration of facilities in specific localities (LGAs or zones).

Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

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