

Geospatial Assessment of the Contributions of the Major Stakeholders to Secondary Schools in Some Parts of Benue State, Nigeria

David Sesugh Aule*, Mamman Saba Jibril, Taiye Oluwafemi Adewuyi

Department of Geography, Nigerian Defence Academy, Kaduna, Nigeria

Email: *auleads@yahoo.com

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Abstract

This study assessed the contributions of the major stakeholders to secondary school education in some parts of Benue State using geospatial techniques. It aimed at producing a queriable spatial database of secondary schools which could be used as a guide for resource distribution and management in the school system. The study adopted, survey, field observation and measurement using Global Positioning System (GPS) to obtain the needed data. Geographic Information System (GIS) and descriptive statistical techniques were employed to map, visualize and analyze the data. The result shows that the private sector has the highest contribution to secondary schools in the area. In the private sector, the private individuals have the highest contributions to secondary school in the area both by ownership, sponsorship and size (student population). The implication is that the system will suffer exploitation by the dominant private individuals in the system. It was recommended that further research should be conducted to assess the relationship between government efforts and other stakeholders on the spatial distribution of secondary schools in the study area.

Keywords

GIS, GPS, Spatial Database, Query, Stakeholders, Sponsorship, Ownership

1. Introduction

Secondary education performs a transition function between Primary school and tertiary education in Nigeria. This makes secondary school an indispensable stage in the Nigerian education system. In Nigeria, education is seen as one of the most promising paths for individuals to realize better and more productive

lives and as one of the primary drivers of national economic development [1]. It is a basic human right and is indispensable for realization of other human rights as a means for accessing broader social, economic, political and cultural benefits [2] [3]. The provision of educational facilities is crucial to bringing education to the door steps of all [4] [5].

The advent of geospatial techniques like Remote Sensing (RS) and Geographic Information System (GIS) has made it much easier to carry out these tasks effectively and efficiently. GIS is viewed as a sophisticated geospatial database management system [6]. Database Management System (DBMS) is an integrated and crucial component of most successful GIS [7]. The potentials of GIS technology in database design and creation have been demonstrated and found to be more efficient than the manual approach [8] [9]. Akpan and Njokwu; Makadi *et al.* and Qaddumi demonstrated the ability of GIS to display locational information of geo-based schools together with useful attribute data [8] [10] and [11].

In Nigeria, one of the major concerns of successive Nigeria governments since attainment of independence in 1960 is implementation of strategies for wider accessibility and reduction of inequalities in educational opportunities among the populace [12]. However, the growth of the educational sector is yet to be matched by real development vis-a-vis the removal of all barriers of inequality of educational opportunities among the people. There are acute shortages of infrastructure and facilities at all levels [2]. Scholars like; [8]; and [13] unanimously confirm that there is inequality of educational opportunities across the country. This perfectly agrees with [14], who stated that; Nigeria has some unique characteristics that tend to make development difficult.

Nigeria is a demographically young nation with most of the teenagers in their secondary school age. Without adequate secondary schools in the country, majority of the young people will be unable to grow educationally and in career attainment. [15] and United Nations' Millennium Development Goals emphasize equal and adequate educational opportunities at all levels. However, many recent studies have shown that Secondary Schools are inadequately supplied and unequally distributed in Nigeria [1] [13] [16] [17] [18] [19] [20]. In Gidan Mango/Garatu axis in Bosso local government area of Niger state, [19] observed that majority of the students walk long distances (0.5 km - 2.3 km) to school. This leads to high dropout rate among secondary school students [21]

This inadequacy and uneven distribution negatively affect accessibility to secondary schools in the country [1] [18] [20]. This limits the chances of some children making transition from primary school to secondary school. It also limits their ability to reach full potential thereby negatively affecting their quality of life.

The limitation of secondary schools in the study area necessitated this study. Therefore, this study attempts an investigation of private participation in the provision of secondary education vi-a-vis government's efforts. Public participant is the government while private participants are the communities, missionary bodies and private individuals. The paper investigates the contributions of

these stakeholders in terms of ownership, sponsorship and size or students' population. This will provide a framework for distribution of schools and services in the state and ensure equitable distribution and adequate access to secondary school facilities and services in the area.

2. Materials and Methods

2.1. Study Area

The study area is Logo, Gboko and Obi local Government Areas in Benue state (Figure 1). These Local Government Areas lie between Latitudes 6°55'54" and 7°9'34" North of the Equator and Longitudes 7°59'20" and 9°56'18" East of the Greenwich Meridian. Logo, Gboko and obi cover land areas of about 1388.908 km², 183.405 km² and 397.016 km² respectively. The climate of the area in general is of the tropic wet and dry climate (Aw) according to Koppen classification scheme. The relief is generally low-lying ranging from below 90 to 150 m on the average. According to 2006, National Population Census of Nigeria, Benue State had a population of 4,219,244 people, out of this figure, Logo Local Government area had 168,063 people, Gboko had 358,936 people and Obi had 98,855 people. These population figures projected at 2.9% show that Logo had 231,188 people,

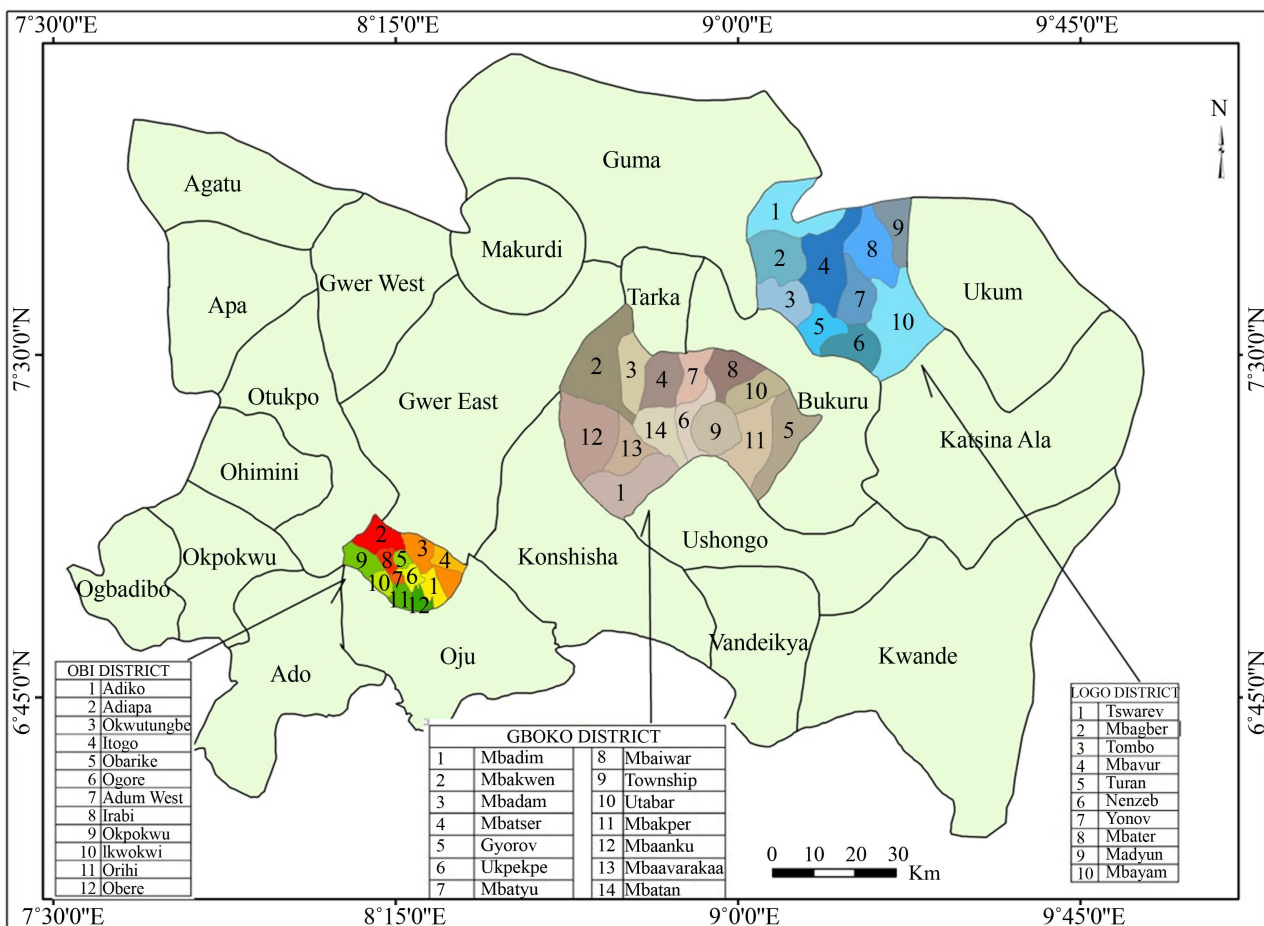


Figure 1. Benue state showing Logo, Gboko and Obi LGAs with their council wards. Source: NCRS Jos.

Gboko had 452,618 people and Obi had 124,656 people in 2015. The nature of the land use in the area varies from one part to another. It is characterized by residential, industrial, commercial, educational, agricultural or open space areas.

2.2. Data and Data Collection Techniques

Both spatial and attribute types of data were used for this study. The spatial data used include geographic coordinates of the existing secondary schools in the area and digital maps of the study area. The attribute data include the names, locations and owners of the schools. These data were sourced from both primary and secondary sources. The primary sources of the data are the researcher's fieldwork using GPS to obtain schools coordinates while interviews were used to obtain attribute data from selected heads of government ministries, educational institutions and districts that were used as guides. The secondary sources of data include the Local Government Information Units, Area Education Offices, Ministry of Land and Survey and National Population Commission.

The target population for this study includes all the secondary schools in the study area. The sampling procedure is multi-staged. First, the stratified sampling technique was used for this study because membership of each stratum is mutually exclusive. Secondly, simple random sampling technique was used to select one Local Government in each stratum. Thirdly, the stratified random sampling technique was used to subdivide the Local Government areas into districts. 120 secondary schools were identified and mapped in the three Local Government areas altogether; 19 secondary schools in Logo Local Government Area, 83 secondary schools in Gboko Local government Area and 18 secondary schools in Obi Local government area.

2.3. Method of Data Analysis

The study employs GIS techniques to show spatial distribution of secondary schools and to create and manipulate database using the query expression. The following techniques were used to acquire and code the needed data:

- 1) Field observation was conducted to collect coordinate points of schools and Ground Control Points (GCP) of the study area using GPS. It was also used to validate some of the data collected from the Ministries and educational institutions.
- 2) Data conversion: Analogue map was converted to digital map by scanning. It was stored in the ArcCatalog extension of ArcGIS and opened in ArcMap environment.
- 3) Digitizing: The map was digitized in ArcMap environment in one layer for the features held in ArcCatalog extension. The features and tables in ArcCatalog were then added using the "x,y" command at the tools menu.
- 4) Georeferencing: Four UTM coordinates were used to georeference the scanned map, ensuring a careful location of the coordinates.
- 5) Attribute creation: the digitized map of the area was imported from Arc-

Catalog to ArcView, attribute tables were created with the data entered accordingly.

6) The ArcGIS interface was used to update the system by retrieving and/or adding more attributes to reflect subsequent changes.

7) The rectangular coordinates (X, Y, Z) of the schools obtained were used to determine the distances of the paired schools in the study area.

The analysis involves creation of thematic maps using GIS to have a visual portrayal of the spatial variation in schools and their attributes. GIS was used to assess the contributions of the various stakeholders using spatial query, mapping and graphic visualization as well as reporting techniques. Descriptive statistics, specifically, simple percentages, statistical tables, and frequency counts were used to quantify and display data according to districts. The quantified data were used as a basis to determine the contributions (efforts) of various stakeholders to secondary schools in the study area.

3. Result

3.1. Contributions of the Major Stakeholders to Secondary Schools

Researcher's field work revealed two major stakeholders to secondary schools in the study area; Public and Private Stakeholders. Contributions in the public sector are all done by the Government while the contributions in the private sector are either done by private individuals, missionary bodies or the communities. This study assesses the major contributors on the bases of number of schools owned by a stakeholder, number of schools sponsored by a stakeholder and the size of the schools sponsored by a stakeholder as shown on **Table 1**.

3.1.1. Stakeholders' Contributions to Secondary Schools in Logo Local Government Area

1) Contributions by ownership

Figure 2 shows the contributions of the various stakeholders to secondary schools in Logo Local Government area by ownership. Geo-statistical analysis of the distribution shows that 36.8% of the schools are provided by the communities, 10.5% of the schools are provided by the Government, 36.8% of the schools

Table 1. Stakeholders' contributions to secondary schools.

	Contributions by Sponsorship				Contributions by size (students' pop)			
	Private Ownership		Govt Grant-Aided		Private		Government	
	Schs	%	Schs	%	Students	%	Students	%
Logo	11	57.9	8	42.1	5980	40.90	8650	59.10
Gboko	61	73.5	22	26.5	35,860	63.75	20,390	36.25
Obi	12	66.7	6	33.3	7240	58.60	5110	41.40

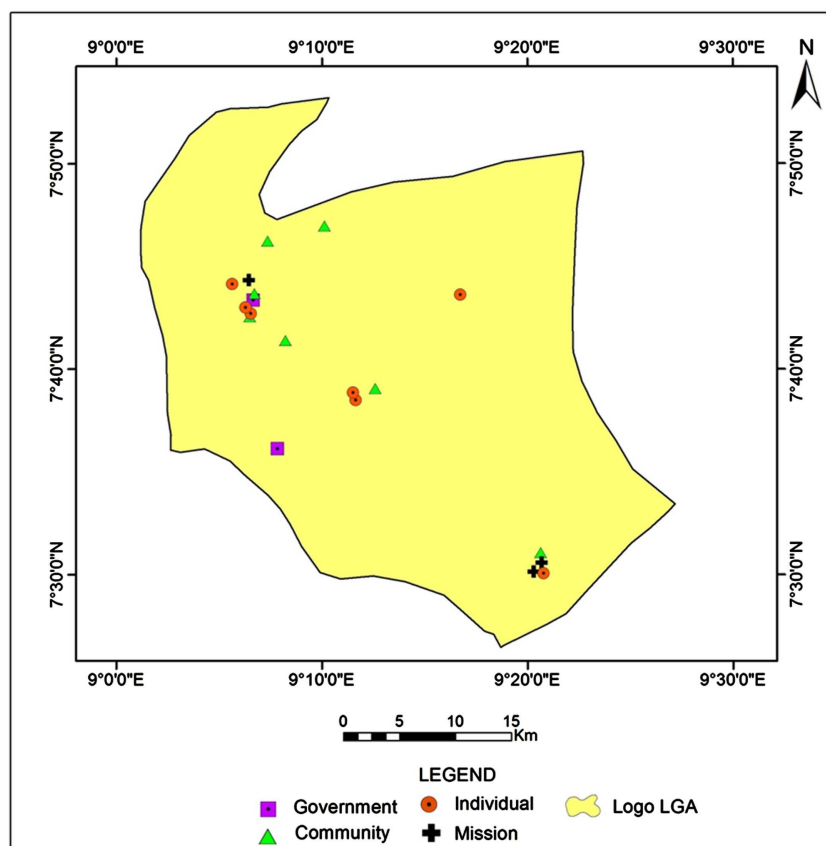


Figure 2. Stakeholders' contribution to secondary schools in logo local government area. Source: Researchers' fieldwork.

are provided by the private individuals while 15.9% of the schools are provided by the missionary bodies. It is obvious from this report that the communities together with private individuals have the highest contribution to secondary school in the area by ownership. This is followed by the missionary bodies while the government has the least share of the total contributions in the area by ownership. This means that the Government has provided only 10.5% to secondary school in the Local government area while the remaining 89.5% is provided by the private sector.

2) Contributions by sponsorship

Assessment of the contributions to secondary schools in the area by sponsorship shows that 42.1% of the schools in the area are Grant aided by the government while 57.9% of the schools are only approved (**Table 1**). This means that the government takes total responsibility of 42.1% of the secondary schools in Logo Local Government Area while the private individuals, Communities and the missionary bodies collectively take responsibility of 57.9% of the secondary schools in the area. This implies that the sponsorship of the private sector is 15.8% more than that of the government.

3) Contributions by size (Students' population)

Assessment of the contributions of the major stakeholders to secondary

schools by size shows that the private sector takes responsibility of 40.90% of the students, while the government takes responsibility of 59.10% (**Table 1**). This shows that the population of the students that are government's responsibility is 18.20% bigger than the population of the students handled by the private sector.

3.1.2. Stakeholders' Contributions to Secondary Schools in Gboko Local Government Area

1) Contributions by ownership

Figure 3 shows the contributions of the various stakeholders to secondary schools in Gboko Local Government area by ownership. Ownership analysis of the distribution reveals that, the communities, government, individuals and missionary bodies have contributed 19.3%, 4.8%, 56.6% and 19.3% respectively. From this it is clear that individuals have the highest share in the contributions. This is concurrently followed by the communities and the missions. The government takes the least share of the provisions. This indicates that the private sector has provided 95.2% of the secondary schools in the area while the government has provided only 4.8% of the secondary schools.

2) Contributions by sponsorship

Considering the sponsorship of secondary schools in Gboko Local Government Area, spatial analysis of the contributions to secondary schools reveals that the Government has grant aided 26.5% of the secondary schools in the area and approved 73.5% of the secondary schools to be operated privately (**Table 1**). This means that the private sector sponsors 47% of the secondary schools more than the government in Gboko Local Government Area.

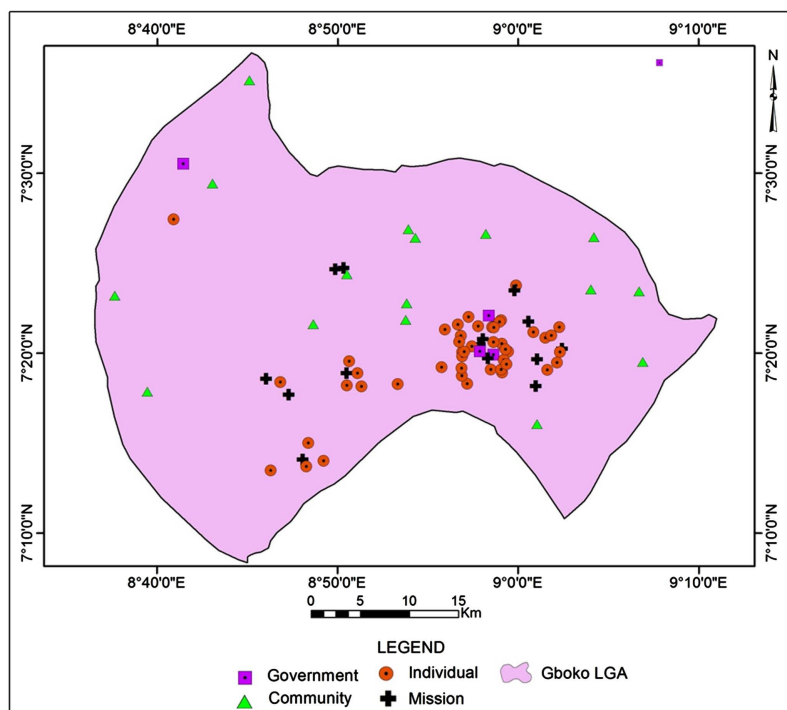


Figure 3. Stakeholders' contribution to secondary schools in Gboko LGA. Source: Researchers' fieldwork.

3) Contributions by size (students' population)

Spatial analysis of the stakeholders' contributions to secondary schools by size in Gboko Local Government Area shows that, the private sector is responsible for 63.75% of the secondary school students' population in the area while the Government is responsible for 36.25% of the population (Table 1). This means that private sector takes responsibility of 27.5% of the secondary school students more than the government.

3.1.3. Stakeholders' Contributions to Secondary Schools in Obi Local Government Area

1) Contributions by ownership

Figure 4 shows the contributions of the various stakeholders to secondary schools in Gboko Local Government area by ownership. Proportionately, ownership analysis of the secondary schools shows that, the communities, the government, individuals and the missionary bodies have provided 22.3%, 11.1%, 33.3% and 33.3% of the secondary schools in the area respectively. This means that the government has provided 11.1% of the secondary schools in the area, leaving the rest of the 88.9% of the secondary schools to the private sector. The implication is that the Government has the least share of the contributions to secondary school in the area as compared to the contribution of the private sector.

2) Contributions by sponsorship

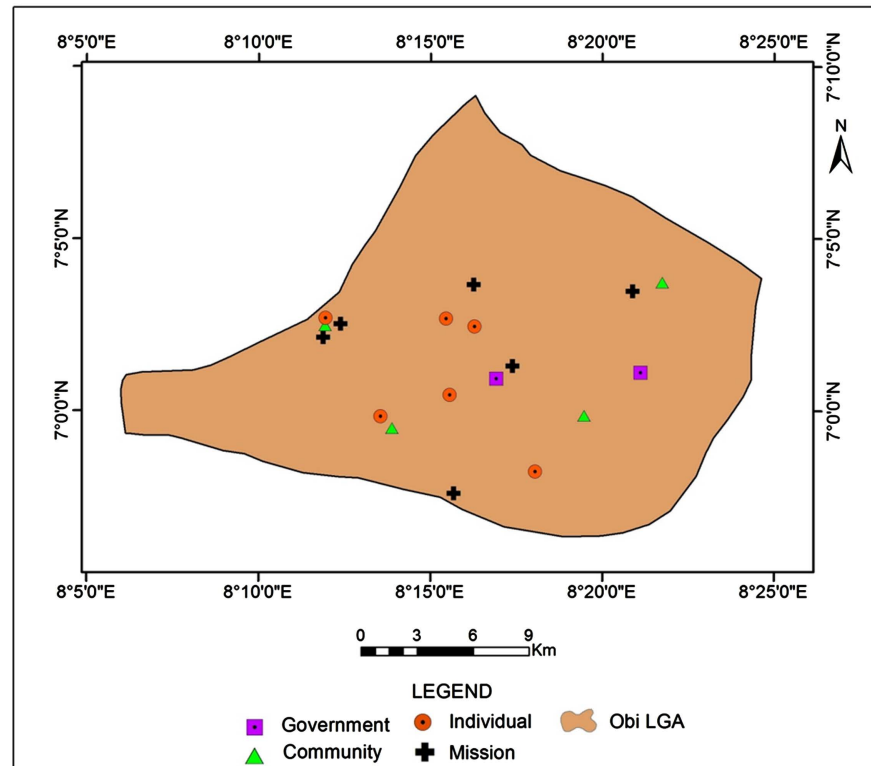


Figure 4. Stakeholders' contribution to secondary schools in obi LGA. Source: Researchers' fieldwork.

The spatial analysis of the contributions to secondary schools in Obi Local Government area by sponsorship shows that the government has grant aided 33.3% of the schools and approved 66.7% of the schools for private operators (Table 1). The difference in sponsorship between the private sector and the government is 33.4%. This means that the sponsorship responsibility of the private sector for the secondary schools is 33.4% more than that of the government.

3) Contributions by size (students' population)

Analysis of the contributions by size shows that the private sector is responsible for 58.60% of the secondary school students in Obi Local Government Area while the government takes care of the remaining 41.40% (Table 1). This means that the population of secondary school students in the private secondary schools is 17.2% more than those in the government secondary schools.

3.2. Spatial Database Analysis of the Schools by Ownership

The spatial database was queried to determine the contributions of the major stakeholders to secondary school education in the study area. The results of these queries could be visualized and interpreted at a glance (Figures 5-9). The results show that 30% of the schools in the area are government grant-aided and 6.7% are owned by the government, 22.5% are owned by the communities, 20.8% are owned by the missionary bodies and 50% are owned by Private individuals. Out of the government grant-aided schools, 22.2% are in Logo, 61.1% in Gboko and 16.7% in Obi Local government areas. Also, 25% of the Government

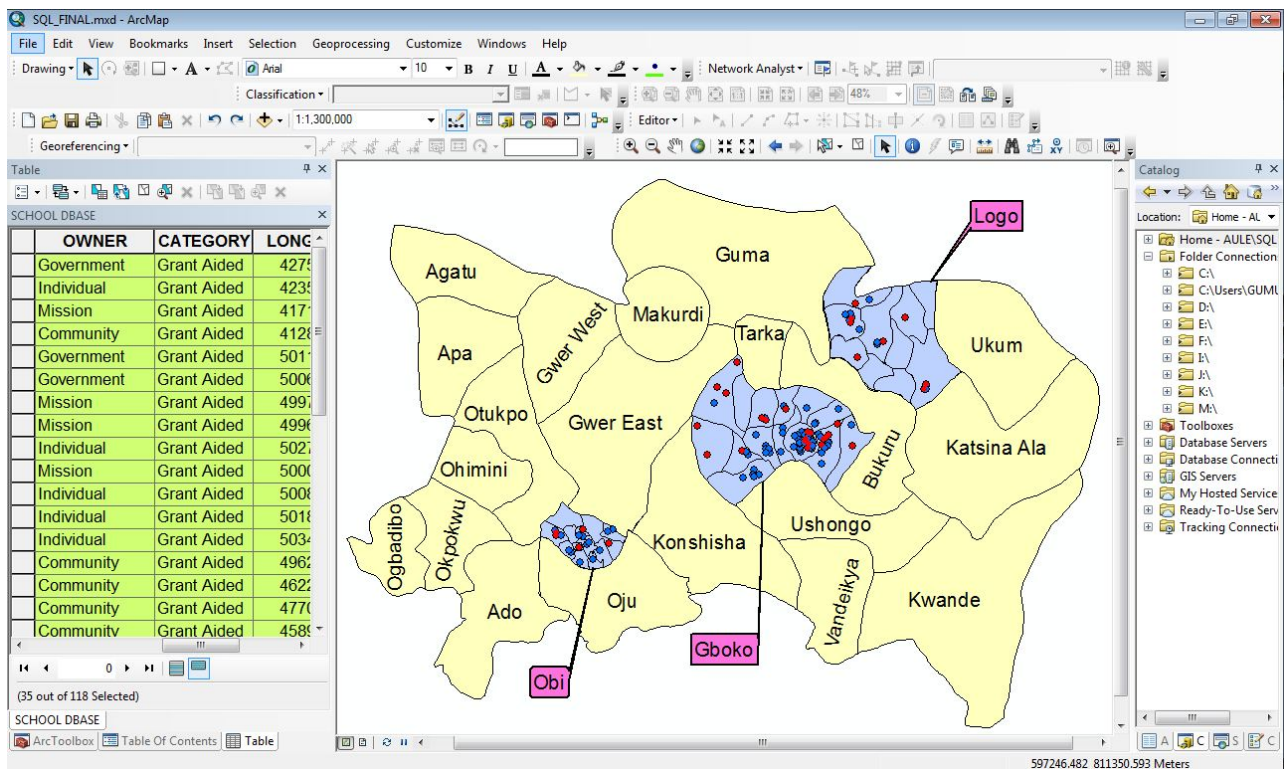


Figure 5. Spatial query showing all the government grant-aided schools.

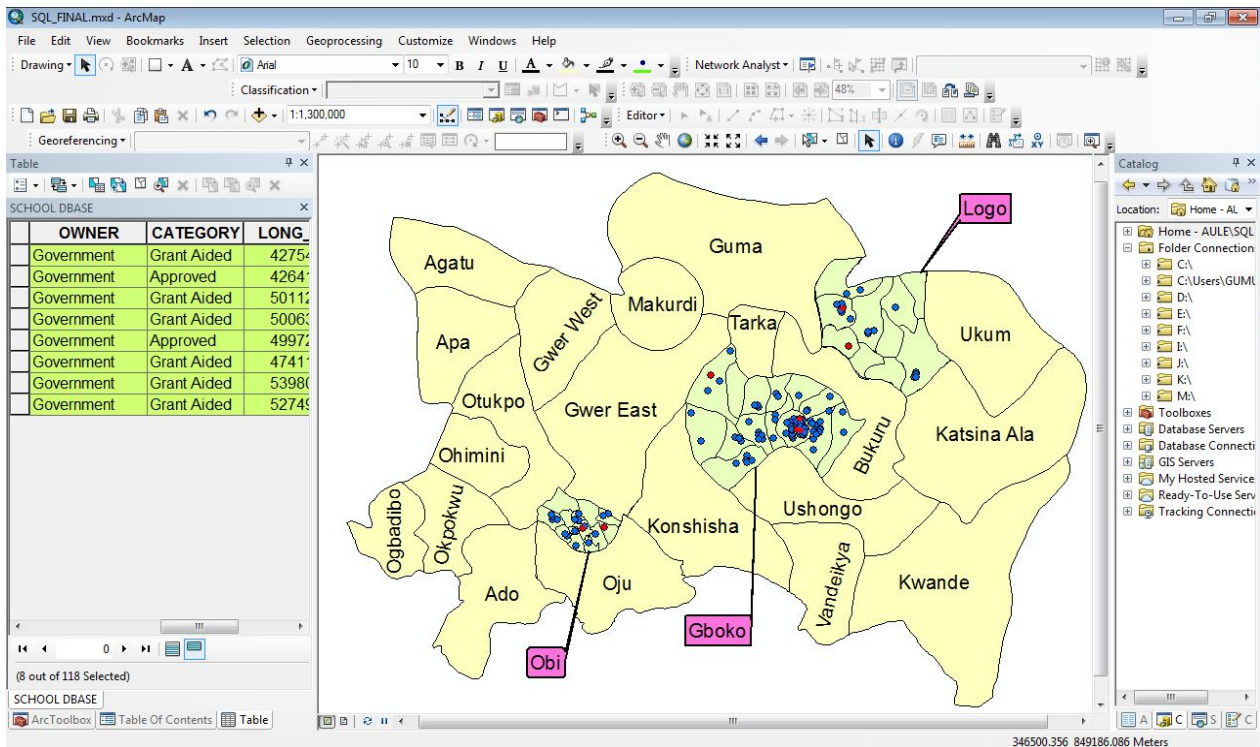


Figure 6. Spatial query showing all the schools owned by the government.

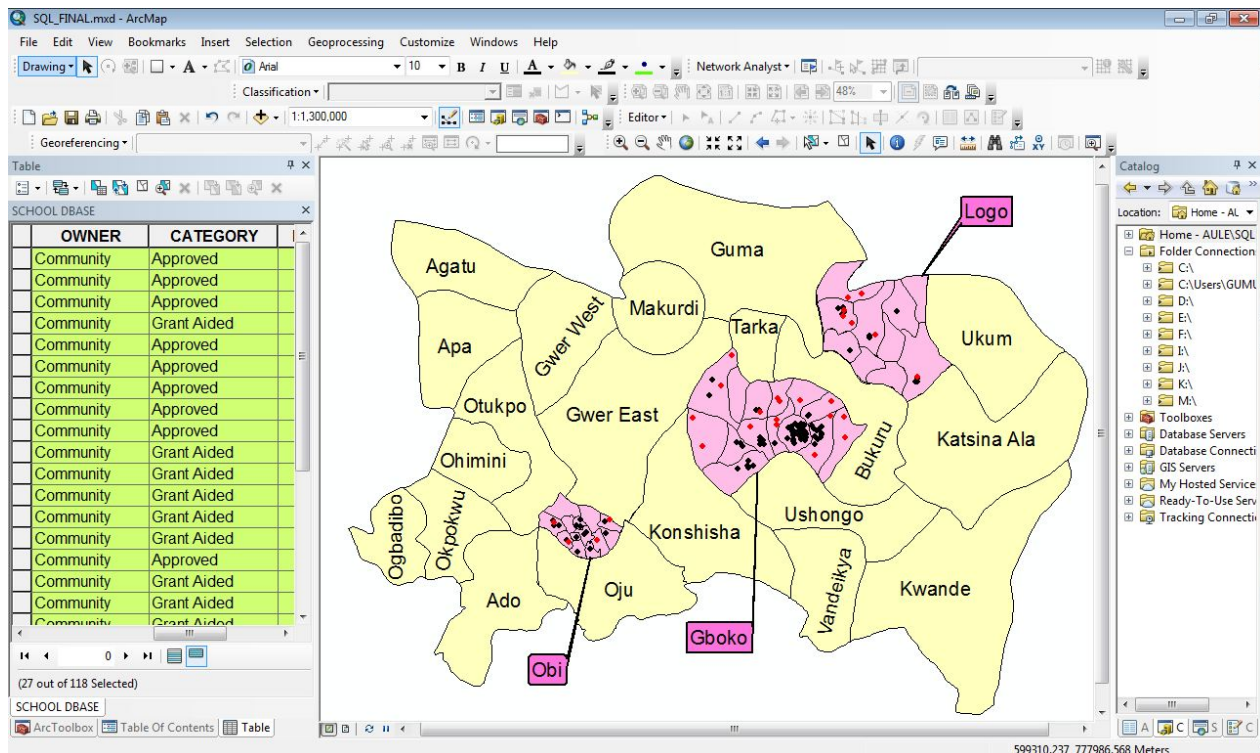


Figure 7. Spatial query showing all the community owned schools.

Secondary schools are in Logo, 50% in Gboko and 25% in Obi local Government Areas respectively. Furthermore, the communities have 28% of their schools in

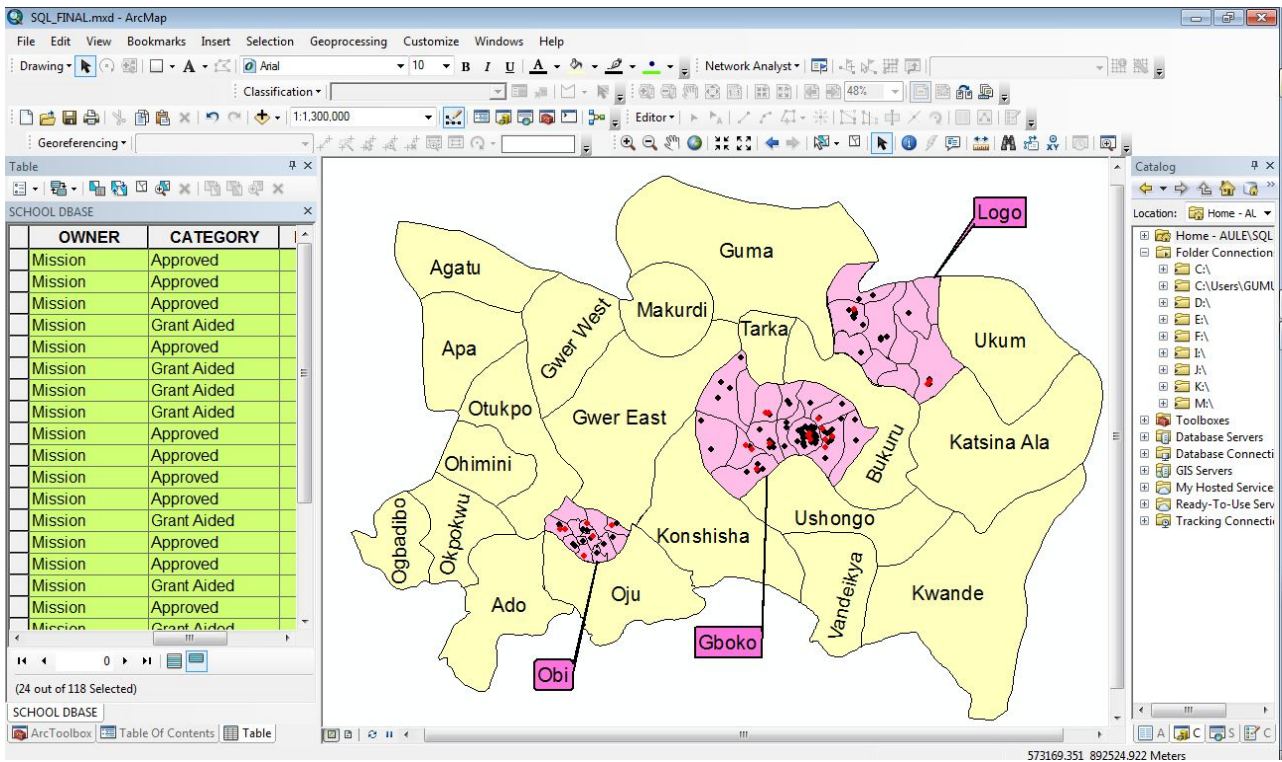


Figure 8. Spatial query showing all the schools owned by missions.

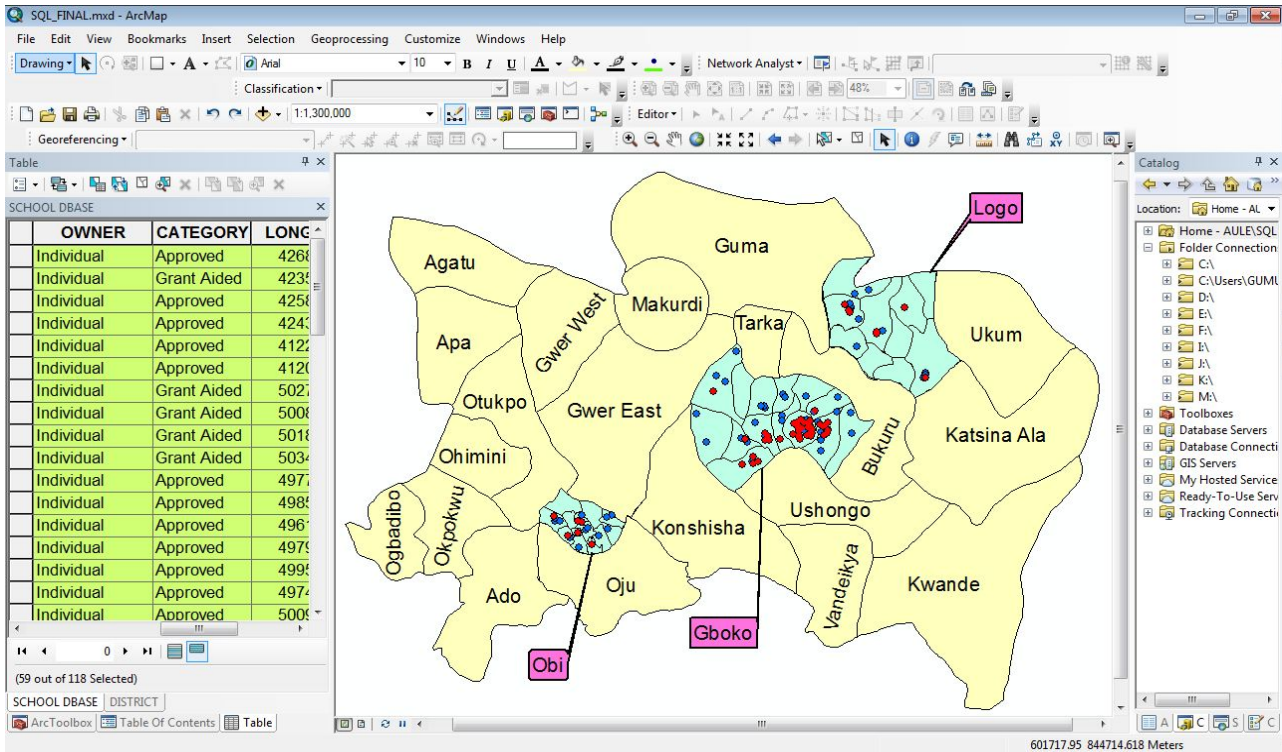


Figure 9. Spatial query showing all the schools owned by individuals.

Logo, while 56% and 16% are in Gboko and Obi Local Government Areas respectively. Again, 12.5% of the missionary schools are in Logo, 62.5% in Gboko

and 25% in Obi local Government Areas respectively. The Private individuals have 11.1% of their schools in Logo, 79.4% in Gboko and 9.5% in Obi Local Government Areas.

In addition, I observed that students sometimes walk up to five kilometers (5 km) or more to school, especially in the rural areas. In Gboko Local Government Area, some districts like Mbadam in Mbatierev do not have a single secondary school. This is against UNESCO standard of two kilometers (2 km) walking distance to school. This suggests that there is lack of access to secondary education in some parts of Benue State, especially in the rural areas, resulting to loss of interest and high dropout rate among students [21]. This implies that Government's efforts in providing secondary schools and services in the state are limited.

4. Discussion

The findings on the contributions of the major stakeholders to secondary schools by ownership show that the private sector comprising of Communities, Missions and Private individuals have the highest contributions to secondary schools in the area. In the private sector, private individuals have the highest share of the contributions, followed by the communities while the missions have the smallest share. Similarly, the population of students in the private schools is relatively larger than that of those in the government sponsored schools. However, the difference is relatively small. In fact, unlike in Gboko and Obi Local Government areas, the Government sponsored schools have the highest population of students in logo Local Government area. Sponsorship assessment also shows that the private sector has the highest share of the sponsorship of secondary school in the area.

This implies that the private sector has the highest contributions to secondary schools in the area. These corroborate the findings of prior studies [19]. This shows that the Government has relaxed her efforts to establish public Secondary Schools [8]. This is possibly why the Government does little or nothing to check the proliferation of sub-standard private secondary schools in the state. Consequently, there is high proliferation of private schools in the study area. The inability of the proliferated Private Secondary Schools to provide sufficient and efficient services could be the reason for the relatively low standard of education identified in the area.

In terms of stakeholders' contribution to secondary schools, the private sector has the highest contributions in all the three Local Government Areas. However, the government has the highest contribution by size in Logo Local Government Area. Generally, Gboko and Obi Local Government Areas have more similarities in spatial distribution of secondary schools than Logo Local Government Area.

Generally, the study area is dominated by the contributions of the private sector to secondary school rather than the efforts of the government. The implication of these results is that, the private individuals, who are the dominant stakeholders, if not regularly controlled, may become autonomous and destroy the system with low standards and exploitations.

5. Conclusions and Recommendations

The study assessed the contributions of the public and private stakeholders to secondary education in Gboko, Logo and Obi Local Government Areas of Benue State using geospatial techniques. Besides the government which is the only stakeholder in the public sector, the stakeholders in the private sector include; Communities, missionary organisations and the private individuals. The contributions were assessed based on ownership, sponsorship and size (students' population). The result shows that the private sector contributes much more to secondary education in the study area than the government, generally. However, the government takes the lion share of the contribution by size in Logo Local Government Area. Based on the result of the study, it was concluded and recommended that:

- 1) Any further decision to grant-aid schools must first favour Obi local Government Area, followed by Logo Local Government Area before Gboko Local Government Area.
- 2) If the Government is to allocate secondary schools to these areas, then Logo and Obi Local Government Areas should be considered since Gboko has the highest number of Government Secondary Schools.
- 3) The communities in Logo and Obi local Government areas should be challenged by this result, to intensify their efforts towards secondary education in their respective communities.
- 4) The missions also need to intensify efforts towards allocation of schools in Logo Local Government Area.
- 5) The Private individuals should either create more schools in Obi and Logo Local Government Areas or relocate the existing schools to these disadvantaged areas. The problem about this decision could be that, the private individuals are likely to refuse to relocate to other places, especially if such areas lack the potential for patronage. At such instances, the Government has to create new schools in the disadvantaged districts.
- 6) Further study should be conducted on the proliferated private secondary schools and their effects to strengthen standards and avoid wrong assumptions.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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