DISTRIBUTIONAL ANALYSIS OF PRIMARY AND SECONDARY SCHOOLS IN PART OF ILORIN EAST AND MORO LOCAL GOVERNMENT OF KWARA STATE, USING GIS APPROACH

By

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CERTIFICATE

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Head of Surveying &Geoinformatics Department.

DEDICATION

This project is dedicated to Almighty God, for His endless grace, wisdom, and strength throughout this academic journey.

I also dedicate this work to my beloved parents and family, whose unwavering support, prayers, and encouragement have been a pillar of strength for me.

To my supervisor and lecturers, thank you for your guidance, patience, and valuable input. Your mentorship has greatly contributed to the success of this project.

Finally, to my friends and colleagues who shared this journey with me, your encouragement and support will always be remembered.

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CHAPTER ONE

1.0 INTRODUCTION

1.1 BACKGROUND OF THE STUDY

In the field of surveying, the accuracy and reliability of spatial data are paramount. Distribution analysis plays a critical role in assessing how data points—such as positional coordinates, elevations, or errors—are spread across a given area. It provides insights into the nature of the data collected, identifies potential anomalies, and aids in ensuring that measurements adhere to acceptable standards of precision

Traditionally, surveying relied on manual instruments and observations, which were prone to human and instrumental errors. With the advent of modern technologies such as total stations, Global Navigation Satellite Systems (GNSS), and Geographic Information Systems (GIS), the volume and complexity of spatial data have increased significantly. This evolution has necessitated more robust analytical techniques, including distribution analysis, to process and interpret the data accurately.

Distribution analysis in surveying allows for the statistical examination of spatial data, such as evaluating the frequency, pattern, and dispersion of points. This is crucial in detecting systematic errors, outliers, or inconsistencies that may affect the final outcome of a survey. It also supports the optimization of data collection methods and enhances the quality control processes within surveying projects.

Moreover, distribution analysis is integral in geodetic and cadastral surveys, topographic mapping, engineering surveys, and environmental assessments. By understanding the spatial distribution of features or measurement errors, surveyors can make more informed decisions that contribute to the effectiveness and sustainability of land development and management.

Therefore, the study of distribution analysis is essential in modern surveying practices, not only for improving data quality but also for supporting the planning, design, and implementation of various spatially-related projects.

1.2 RESEARCH QUESTIONS

Research Premise and Questions

This research seeks to analyze the spatial and infrastructural dynamics of the school environment to support better planning and resource allocation. The study is guided by the following key questions:

1.What is the spatial distribution of structures in the school?

•Assessing the arrangement and positioning of buildings within the school premises.

•Identifying patterns in the distribution of classrooms, administrative blocks, dormitories, and other facilities.

2.What are the capacities of classrooms in relation to their area in square meters?

•Measuring classroom sizes to determine their capacity for accommodating students.

•Evaluating how well the available classroom space meets student needs.

3.What is the ratio of classrooms to students in a day and boarding school setting?

•Comparing the number of classrooms to student enrollment.

•Differentiating between day and boarding students to assess space utilization.

4.What is the configuration of the school, and how do erosion and other natural phenomena affect it?

•Examining the layout, accessibility, and connectivity of school structures.

•Assessing the impact of erosion, flooding, and other environmental factors on school infrastructure.

5.How can the generated products support decision-making?

•Developing maps, models, and reports to guide school management.

•Providing data-driven insights for optimizing space, improving infrastructure, and mitigating environmental risks.

By addressing these questions, the research aims to enhance the planning, safety, and functionality of the school environment

1.3 STATEMENTS OF PROBLEM

In surveying, the precision and accuracy of spatial data are fundamental to the success of any mapping or land development project. However, challenges often arise due to the uneven distribution of data points, measurement errors, and varying field conditions that can compromise the integrity of survey results. Despite advancements in surveying technologies and data processing tools, there remains a significant gap in the consistent application of distribution analysis to identify and correct these spatial inconsistencies.

Many surveying projects suffer from inadequate evaluation of the spatial distribution of collected data, leading to the misrepresentation of physical features, poor decision-making, and increased project costs. Errors that go undetected due to a lack of distribution analysis may result in the propagation of inaccuracies throughout mapping outputs, engineering designs, or cadastral records.

1.4 AIM OF THE PROJECT

The aim of this project is to conduct a distribution analysis of primary and secondary schools in parts of Ilorin East Local Government, Kwara State, using surveying and GIS approaches. This study seeks to assess the spatial distribution, accessibility, and infrastructural adequacy of schools to support effective educational planning and decision-making..

1.5 OBJECTIVES OF THE PROJECT

The project will involve key operations necessary for achieving accurate distribution analysis. These include:

1.Data Collection / Acquisition:

•Gathering spatial data on the location and distribution of primary and secondary schools in Ilorin East Local Government.

•Using surveying techniques (GPS, total station) and GIS datasets (satellite imagery, government records) to ensure accuracy.

2.Data Processing:

•Analyzing spatial data using GIS tools to assess school distribution, accessibility, and infrastructural capacity.

•Performing geo statistical analysis, spatial interpolation, and mapping to visualize school locations and coverage.

3.Data / Information Presentation:

•Creating thematic maps, reports, and charts to present findings effectively.

•Providing insights for policymakers and stakeholders to enhance educational planning and infrastructure development.

These processes will ensure a comprehensive spatial analysis that supports better decision-making regarding school distribution and accessibility

1.6 SCOPE OF THE PROJECT

The scope of this project outlines the key steps and methodologies that will be implemented to achieve accurate distribution analysis of primary and secondary schools in Ilorin East Local Government, Kwara State. The following activities will be carried out:

1.Reconnaissance:

•A preliminary field visit to assess the study area and identify key locations for data collection.

2.Station Selection

•Identifying and establishing control points for accurate data collection.

•Ensuring proper geo referencing of survey points to maintain spatial accuracy.

3.Data Acquisition Using Radiation Method with Total Station (Kolida R554):

•Employing the radiation method of surveying to measure school locations and spatial coordinates.

•Using the Kolida R554 Total Station to obtain precise positional data.

4.Data Processing Using AutoCAD 2018 and ArcMap 10.2 Series:

•Importing and refining survey data using AutoCAD 2018 for accurate mapping.

•Analyzing spatial distribution patterns in ArcMap 10.2 for GIS-based assessment.

5.Information Presentation in the Form of Plans and Maps:

•Producing thematic maps, charts, and spatial models to visualize school distribution.

•Generating site plans and digital maps for decision-making support.

6.Comprehensive Report Writing:

•Documenting findings, methodologies, and recommendations in a detailed report.

•Providing insights for stakeholders to improve school planning and infrastructure allocation.

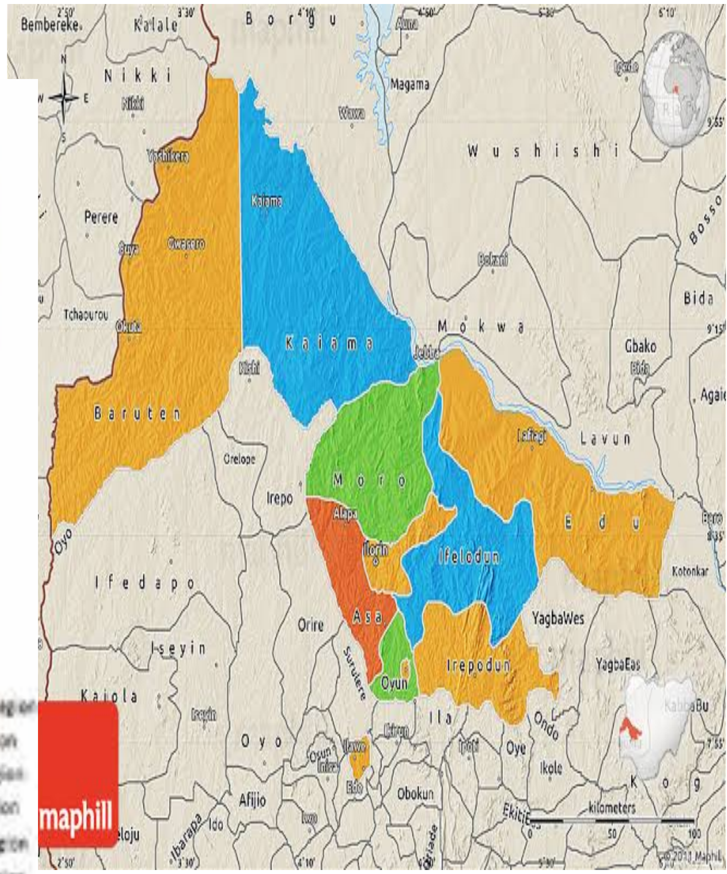
This structured approach ensures that the study effectively captures, analyzes, and presents the spatial distribution of schools, contributing to better educational infrastructure planning.

1.7 SIGNIFICANT OF THE STUDY

This study will guide school planners, policymakers, and administrators in assessing the distribution of secondary schools, ensuring better infrastructure planning and resource allocation. It will also help educators, students, and researchers understand the importance of facility management and accessibility to quality education.

1.8 Study Area

Ilorin East Local Government, one of 16 in Kwara State, has a rich history from pre-colonial trade to modern development. Key landmarks include the University of Ilorin,



Map of Nigeria

Map of kwara state

1.9 PERSONAL ASSIGNED FOR THE PROJECT

Fieldwork Participant

The following students participated in the fieldwork for this project:

S/N	Name	Matric No.
1	Olatunbosun Abolade C.	HND/23/SGI/FT/0001
2	Lawal Zainab O.	HND/23/SGI/FT/0002
3	Abiola Aminat T.	HND/23/SGI/FT/0010
4	Olagunju Segun	HND/23/SGI/FT/0003
5	Omotosho Jamiu O.	HND/23/SGI/FT/0005
6	Sarafadeen Akanfe O.	HND/23/SGI/FT/0004

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 INTRODUCTION

This chapter reviews existing literature relevant to the distribution of primary and secondary schools, the application of Geographic Information Systems (GIS) in educational facility planning, and theoretical frameworks that underpin spatial analysis. The review will establish the research gap that this study aims to fill, particularly focusing on Ilorin East and Moro Local Government Areas (LGAs) of Kwara State, Nigeria.

2.2 CONCEPTUAL CLARIFICATIONS

2.2.1 CONCEPT OF DISTRIBUTION OF EDUCATIONAL FACILITIES

Educational facilities distribution refers to the spatial arrangement and location of schools within a given geographical area to adequately serve the population. According to Akintayo (2015), the spatial distribution of schools should ensure equitable access for all segments of the society, regardless of location, gender, or socio-economic status. Effective distribution minimizes the distance students travel to access schools, enhances enrollment rates, and promotes educational equity.

2.2.2 IMPORTANCE OF SCHOOL DISTRIBUTION

Proper school distribution:

•Reduces transportation costs and travel time.

•Increases student enrollment and attendance.

•Supports community development by encouraging settlements near schools.

•Promotes gender parity, as shorter distances are especially important for female students (UNESCO, 2016).

2.3 GEOGRAPHIC INFORMATION SYSTEMS (GIS) IN EDUCATIONAL PLANNING

GIS refers to computer-based tools for capturing, storing, analyzing, managing, and presenting spatial data. In educational planning, GIS offers numerous advantages, including:

•Mapping existing school locations.

•Analyzing the spatial distribution relative to population density.

•Identifying underserved or overserved areas.

•Predicting future needs based on population growth trends.

According to Yusuf et al. (2017), GIS provides a powerful decision-making tool for governments and planners to optimize the siting of educational facilities.

2.3.1 ADVANTAGES OF GIS IN EDUCATIONAL DISTRIBUTION ANALYSIS

•Visual representation of data enhances understanding.

•Facilitates the integration of multiple variables (population, road networks, topography).

•Enables dynamic updating and simulation for future planning (Egboka&Nwankwo, 2014).

2.3.2 APPLICATION OF GIS IN PREVIOUS STUDIES

Studies such as Olatunji (2019) have used GIS to evaluate school accessibility in Lagos, finding significant disparities between urban and rural settings. Similarly, Okafor (2018) applied GIS to assess the distribution of public schools in Enugu State, concluding that most rural areas were underserved.

2.4 THEORETICAL FRAMEWORK

2.4.1 CENTRAL PLACE THEORY

Proposed by Walter Christaller in 1933, the Central Place Theory explains the distribution patterns of services, including schools, across a region. It suggests that central places (like towns or major villages) provide services to surrounding hinterlands, with distance and population size influencing the location of facilities (Abiodun, 2015).

2.4.2 GRAVITY MODEL

The gravity model in geography predicts that larger schools (in terms of facilities or reputation) attract more students, but the number of students decreases as the distance from the school increases (Onokerhoraye, 2016).

2.4.3 LOCATION-ALLOCATION MODEL IN GIS

This model identifies optimal locations for services based on minimizing travel distance and maximizing service coverage. It is widely used in GIS applications to ensure equitable distribution of schools (Longley et al., 2015).

2.5 Educational Facility Distribution in Nigeria

2.5.1 National Overview

Nigeria's educational infrastructure shows significant disparity between urban and rural areas. Studies (Ajayi, 2014; Ogundele, 2017) reveal that urban centers are generally better served with educational facilities compared to rural regions, where students often travel long distances to the nearest school.

2.5.2 FACTORS INFLUENCING SCHOOL DISTRIBUTION

Several factors influence the location and distribution of schools:

•Population density: Areas with higher population often have more schools.

•Political influence: Location decisions are sometimes driven by political rather than educational needs.

•Topography and accessibility: Difficult terrain often discourages the establishment of schools (Ogundare, 2013).

•Economic activities: Areas with higher economic activity levels attract more schools.

2.6 PREVIOUS GIS-BASED STUDIES ON SCHOOL DISTRIBUTION

Several researchers have utilized GIS in analyzing educational facilities distribution:

•Aderamo (2007) analyzed the distribution of secondary schools in Ilorin and found clustering in urban areas with sparse distribution in peri-urban and rural zones.

- Ogunlade and Ayodele (2015) in Oyo State demonstrated that most rural dwellers travel more than 5 km to access basic education, negatively affecting attendance rates.

•Ishola et al. (2020) applied GIS to map school accessibility in Ogun State, showing that equitable distribution leads to improved literacy rates and social development.

2.7 THE STUDY AREA CONTEXT: ILORIN EAST AND MORO LGAS

Ilorin East is part of the metropolitan area of Ilorin, with better infrastructural development and a relatively higher concentration of schools compared to Moro, which is predominantly rural with scattered settlements. The difference in settlement patterns, population densities, and road networks suggests potential disparities in school distribution that this study seeks to analyze using GIS.

2.8 GAPS IN LITERATURE

Despite the wealth of studies on educational facility distribution, relatively few have focused specifically on the localized analysis of Ilorin East and Moro LGAs using GIS. Most existing studies concentrate on broader state-wide assessments or focus solely on urban centers. Furthermore, few have provided practical location-allocation models for proposing new school sites based on accessibility and demographic needs

2.9 SUMMARY

This chapter has reviewed concepts, theories, and prior research relevant to the distribution of educational facilities and the application of GIS in spatial analysis. It is evident that equitable access to education remains a significant challenge, especially in rural areas like Moro LGA. Byapplying GIS tools, this study aims to provide a more detailed, evidence-based understanding of school distribution patterns in Ilorin East and

Moro LGAs, thus filling an existing gap in scholarly research and contributing to effective educational planning in Kwara State.

CHAPTER THREE

3.0 METHODOLOGY

This chapter deals with stages and techniques involved in the execution of the project task from the, reconnaissance to data capture, database design up to the analysis stage and information presentation.

3.1. RECONNAISSANCE/PLANNING

Reconnaissance is the preparatory aspect of the project known as preliminary survey or investigation. It involves the collection of all necessary information relating to the job as well as making visitation to the field in order to get the real picture of the project site. Reconnaissance is of two types, namely office and field reconnaissance.

3.1.1 OFFICE PLANNING

This involves the collection of all necessary data such as control points coordinates, permission letter as well as logistics and planning on how to embark on the project. Ground control data and information about the job were decided to be obtained using South Dual Frequency Global Positioning System owing to the nature and large area involved

Table.3.1 shows the Coordinates of controls

Station	Northing(m)	Easting(m)	Height(m)
PBIL3306	940288.197	678281.701	355.212
PBIL3304	940275.508	678254.250	350.532

Source: office of surveyor general kwara state

3.1.2 FIELD RECONNAISSANCE

This involved visiting the project site to have an overall view of the few of the schools to be surveyed. The station points were marked out along road junctions and at convenient points to be able to capture data of the area. At the end of the whole exercise, a sketch diagram known as recci diagram shown below in fig. 3.6. The type of analysis to be carried out was also known from the survey carried out. The configuration of the hardware and the software system required of the work were also known through field recci and also in the choice of appropriate model and structure to use.

Fig. 3.1: shows Reece Diagram of the study area

3.1.2 EQUIPMENT USED AND SYSTEM SELECTION

EQUIPMENT USED

The equipment used for this project includes the following:

i. 1 number of South Dual Frequency Global Positioning System and accessories

ii. 1 number of Downloading cable

iii. Computer system

iv. Field book and writing materials

SYSTEM SELECTION

HARDWARE REQUIREMENT

i. Operating System: windows 10

ii. Device: HP laptop

iii. Model: Intel® core(TM)2 DUO

iv. Processor Speed: 2.40GHz

v. RAM: 4.00 GB

vi. System type: 64-bit operating system

SOFTWARE REQUIREMENTS

1. Notepad

2. Microsoft excel

3. AutoCAD 2007 was used for plotting

4. ArcGis 10.2 was used for data analysis, spatial search and creation of database

5. Microsoft word 2007 for report writing

6. Microsoft power point for information presentation

3.1.3 TEST OF INSTRUMENTS

The only instrument test was the test of the South Dual Frequency Global Positioning System. South Dual Frequency Global Positioning System Base was set up on a station and the Rover was taken to two points A&B at an interval of about 30m to test for distance and coordinate accuracy.

All the necessary adjustment was carried out before the start of observation. The observation was done and the following data were recorded

Status (P):	Fixed
Horizontal Root Mean Square (H):	0.014
Vertical Root Mean Square (V):	0.021
Satellite Number (S):	10+4
Communication Mode (Channel):	4
Time (T)	11:05:38

3.2 CONTROL CHECK

Control check was carried out on the beacons PBIL3306 and PBIL3304 in order to ensure whether they were still maintaining their original positions. The reference receiver (base receiver) was set on PBIL3306 while the rover receiver was set on PBIL 3304. The following are the result obtained

Table 3.7: Coordinate of the observed and the original values of PT 02

Station	Northing(m)	Easting(m)	Height(m)	Status	Remark
PBIL3304	940288.197	678281.701	355.212		ORIGINAL
PBIL3304	940288.212	678281.681	350.532	FIXED	OBSERVED
DISCREPANCY	0.015	0.O20			

Source: - field work

The result shows that the control pillars were in Situ and in good condition for the survey operation. In the case of the instrument, it can be concluded to be in good working condition.

3.3 DATA ACQUISITION

Basically, there are two ways of acquiring data for any project; these are primary data acquisition and secondary data acquisition.

Primary Data Acquisition

The primary data acquisition includes both spatial and attributes data. The data set of the spatial data was acquired through the use of South Dual Frequency Global Positioning System and the attribute data was acquired through social survey that involved asking questions from the residents anything concerning the utility in the area.

SECONDARYDATASOURCE

An imagery of the area was acquired through Updated Google earth; this was used to ascertain the extent of coverage of the project area.

3.3.1 GEOMETRIC DATA ACQUISITION

South Dual Frequency Global Positioning System was used for this geometric data acquisition. The base of South Dual Frequency Global Positioning System was set up on a Second Order Control at sangokulende area, number PBIL3306, we performed all necessary temporary, permanent adjustment, and instrument configuration was carried out, the existing coordinate of the occupied point was inserted on the data logger of the base instrument which is (940288.197). The rover of the instrument was configured with base station as follows:

- ✓ The unit of observation……..Minna Datum Zone 31P
- ✓ Ellipsoid…………………..Rinex
- ✓ Range …. 50km radius
- ✓ Observational procedure….. Stop and Go

After all setting was done; we start the observation by taking the rover to first point in Sango for coordinate acquisition to determine the other details. The coordinates were stored in the instrument memory of the rover which has been connected to the base. This process was repeated throughout the subsequent stations (schools).

3.3.2 ATTRIBUTE DATA ACQUISITION

We acquire attribute date through questionnaire feasibility studies, the following are data acquired:

- ✓ Total number of class rooms in each school
- ✓ Total of pupils/Student in each class

- ✓ Total number of Pupil/Students in each school
- ✓ Population of each locality/environment
- ✓ Ministry of Education guideline for sitting schools

3.4 DATA PROCESSING

This process described how data is converted into information. Data are organized into structure group and database. The data acquired were downloaded using South Dual Frequency Global Positioning System cable to transfer data into personal computer and AutoCAD 2016 with ArcGIS 10.1 version was used for all drawings and database creations.

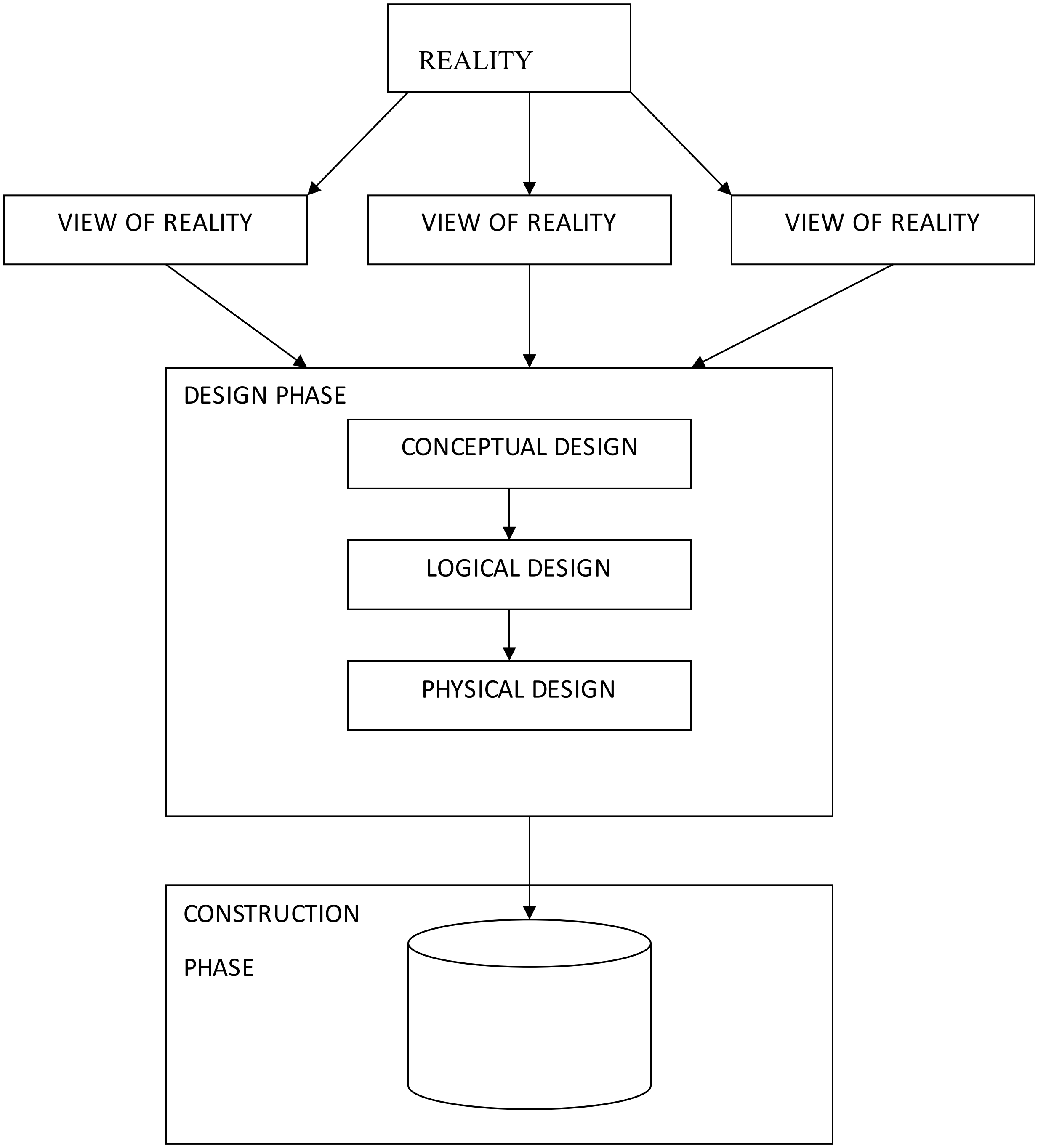
3.5 DATABASE DESIGN

The database is the heart of a GIS. The process of designing such a database is called data modeling. Data Model is the simplification and representation of reality, that is the process by which the real world entities and their inter-relationships are analyzed and modelled in such a way that maximum benefits are derived while utilizing a minimum amount of data. A database is as an organized, integrated collection of non-redundant data stored so as to be capable of use by different logical paths. It involves the following segments: Reality, Conceptual design, logical design and physical design.KufoniyiOlajide (1998)

In database design, four basic steps were normally taken. These steps are:-

1. View of reality.
2. Translation of reality to conceptual model.

3. Physical design.
4. Translation of conceptual model to logical design.



SPATIAL DATABASE

Fig 3.2: Design and Construction Phases of a Spatial Database (Kufoniyi, 1998)

3.5.1 VIEW OF REALITY

Realities were articulated based on geographical data within the study area with respect to Government schools distribution. In this case reality includes the Type of School, Number of classrooms, and population of students.

The creations of spatial database are in three phases. These are:-

i. Conceptual design phase, that is the arrangement or decision on how the view of reality will be simplified to satisfy the information required.
ii. Logical design that is the representation of the data model, designed to reflect the recording of the data in computer system called data structure.
iii. Physical design phase, this is the implementation of the type of GIS software to map out the data for variable manipulation, which can also take care of non-spatial queries as done with any other normal database management system (DBMS).GIS database's fashion from the fact that the data elements of the database are closely interwoven and therefore need to be structured for easy integration retrieval

According to Healey (1991), a proper database organization needs to ensure the following:-

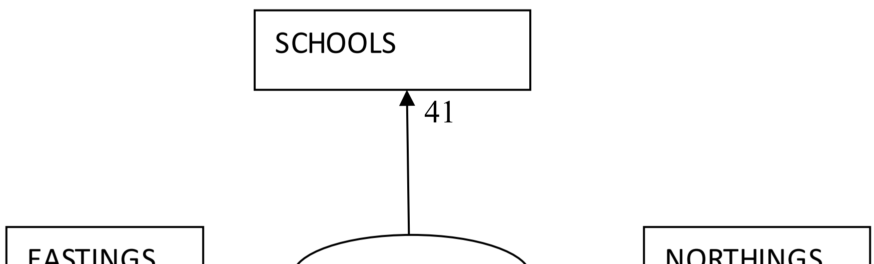
1. Flexibility in the design to adapt to the needs of different users.
2. A system of validation checks to maintain the integrity and consistency of the data elements.
3. A controlled and standardized approach to data input and updating.
4. A level of security for minimizing damage to the data.
5. Reducing redundancy in data storage

3.5.2 CONCEPTUAL DESIGN

This is the representation of the human conceptualization of reality in simplified manner in such a way that a minimum amount of data is utilized to satisfy the project requirement to achieve its aim. The aim is to determine the basic entities, the spatial relationship and their corresponding attributes. What must be decided is how the entities are going to be represented but still satisfy the information requirement of the individual or organization concerned. The following were identified:

i. The related data sets
ii. Basic geometric and thematic data components of the application, which are node, arc, polygon (polygon only came in for the perimeter of the study area)
iii. The basic spatial object, their attributes and interrelationship. These spatial object were points and lines

Fig. 3.4: Schools and its attribute



3.5.3 LOGICAL DESIGN

This refers to the translation of conceptual model into logical design to represent a data model which can be acceptable by the computer that is the representation of data in a computer memory. In this stage, the data were structured to describe logically arrangement of data in the database. Relational data structure was chosen to implement the model because of its flexibility capability very wide deployment within and outside GIS.From the entity-relationship diagram, the following tables were designed.

Attribute of School table

S/NO	ATTRIBUTE COLUMN	DESCRIPTION
1	S_ID	SCHOOL IDENTITY
2	SCH_AREA	SCHOOL AREA
3	SCH_STATUS	SCHOOL STATUS

3.5.4 PHYSICAL DESIGN

This is the representation of data format of implementation software which is usually done at the beginning of the database creation phase. The software used is ArcGIS 10.1

Table 3.11: Data Declaration

FIELD NAME		FULL PROPERTIES				
	Data Type	Allow null values	Default values	Length	Geometry type	Grid
Shape	Geometry	Yes	Nil	Nil	Point	
Id	integer	Yes	Nil	Nil	Nil	
Location	Text	Yes	Nil	25	Nil	
school_source	Text	Yes	Nil	25	Nil	
Easting	Float	Yes	Nil	Nil	Nil	
Northing	Float	Yes	Nil	Nil	Nil	

3.5 DATABASE IMPLEMENTATION

The Arc GIS was lunched. The default table created for the graphics was then edited and other fields were formed .The table was populated to link schools, location and population with their attributes from where queries were made. The extract of attributes and topples created for the project are shown below

3.5.1 DATA SECURITY

This refers to the protection of data against unauthorized disclosure, alteration or destruction. The main aim is to protect the integrity of the data against system malfunctioning, virus, infection, technical hiccups or human error. Database security deals with all various aspect of protecting the database content, its owners and its users. Security measures include the use of fire proof vault, the preparation of microfilmed duplicates or regular creation of backup copies for all computer files and controlled access to sensitive areas.

3.5.2 DATA INTEGRITY

This is the process of ensuring that the data in the database is accurate and setting of certain constraint to prevent inconsistency in the database. Integrity of the database must be ensure at all times, thus care must be taken when inserting data and updating the database. The integrity enforced/utilized by Arc GIS 10.2 is that of data type constraint. The software prevents for example a text value from being entered in a field that was declared as number. Also to ensure quality in GIS, separate databases were created for graphic data and non-graphic data. They were linked via identification codes. In this way each file could be managed separately.

3.5.3 DATABASE MAINTENANCE

Proper keeping, updating and management of database ensure on its currency and fitness for the purpose for which the database was created. The quality of the database depends on its currency and its fitness for use as a decision support system and must be maintained.

CHAPTER FOUR

4.0 RESULT AND DISCUSSION

4.1 NAME OF SCHOOLS CONSIDERED FOR THE PROJECT

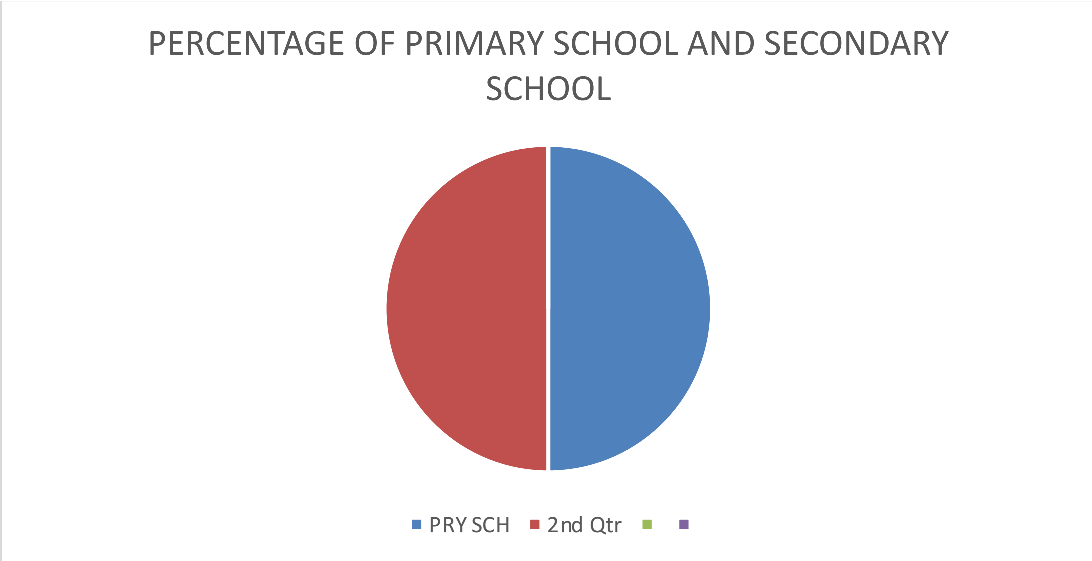
The schools considered for this project are both Primary and Secondary schools in Part of Ilorin East, South and Moro Local Government Area of Kwara State. From the table below, we have total number of (17) seventeenth schools for the distribution analysis within the part of the study area.

Table 4.1: Name of Schools

S/N	NAME OF SCHOOL	ADDRESS	LGA	STATUS
1	Govt Day Sec Sch	Sango, Ilorin	ILORIN EAST	Secondary
2	Govt Day PriSch	Sango, Ilorin		Primary
3	GalikiPri. Sch	Sango, Ilorin		Primary
4	Maya/ IleApaPriSch	Maya, Ilorin		Secondary
5	Eleko LGEA	Idi Ori, Ilorin		Primary
6	OkeOse LGEA	Abanta road		Primary
7	Sentu LGEA	Lajiki road		Primary
8	Govt Girls College	Old jebba road		Secondary

9	C.S.S. OkeOyi	Jolasun Road		Secondary
10	LGEA OkeOyi	Old Jebba Road		Primary
11	LGEA Sch II OkeOyi	Lanwa Road		Primary
12	Tepatan Sec Sch	Oyun, Ilorin	MORO	Secondary
13	TepatanPriSch	Oyun, Ilorin		Primary
14	Sch of Special Needs	Oyun, Ilorin		Secondary
15	Eleko LGEA	Idi Ori, Ilorin		Primary
16	KwaraPoly Sec Sch	KwaraPoly campus		Secondary
17	KwaraPolyPriSch	KwaraPoly campus		Primary

Source: Field Observation Data, Author, 2025.



4.2 POPULATION PER LOCATION

From the table below, we have total number of (17) seventeen schools in consideration within the part of the study area. The population of each location (community) was taken from the Population Census website using 2006 record and 2025 population projection for the analysis.

Note: - the last census was conducted in 2006 and to estimate the population for 2025, we employed the compound annual growth rate (CAGR) method. This approach assumes a constant growth rate over the specified period.

The population of local government per yearly growth rate of 3.41% and the formula use to calculate 2025 shows below;-

$$P = P_{\circ} \times (1 + r)^{n}$$

Where P = final population

$P_{\circ}$ = initial population

r = growth rate (3.41%)/year = 0.0341

n = numbers of year (2025 - 2006 = 19 years)

The 2025 approximate calculation for Ilorin East, South and Moro local government area are:

Ilorin east = $P=207{,}462\times(1+0.0341)$ ^19years = 392,307.68

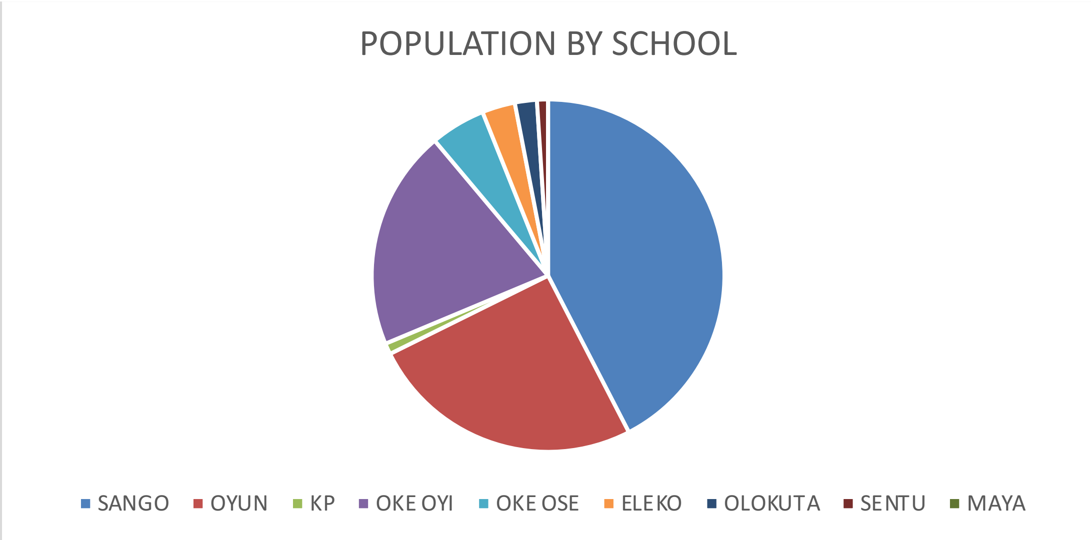
Moro = $P= 108{,}715 \times (1+0.0341)$ ^19years = 205,578.50

Table 4.2: Name of Schools

S/N	NAME OF SCHOOL	Community	ADDRESS	2006 CENSUS	2025 APP. POPULATION *PROJECTION*
1	Govt Day Sec Sch				
2	Govt Day PriSch				
3	GalikiPri. Sch				
4	Maya/ IleApaPriSch				
5	Eleko LGEA	A	Ilorin East	207,462	392,307.68
6	OkeOse LGEA				

7	Sentu LGEA				
8	Govt Girls College				
9	C.S.S. OkeOyi				
10	LGEA OkeOyi	B	MORO	108,715	205,578.50
11	LGEA Sch II OkeOyi				
12	Tepatan Sec Sch				
13	TepatanPriSch				
14	Sch of Special Needs				
15	Eleko LGEA				
16	KwaraPoly Sec Sch				
17	KwaraPolyPriSch				

Source: Field Observation Data, Author, 2025.



From table 4.2 above :- it observe that the larger population In the showing area is in community A, comprising Sango and Galiki both have a total of 3 schools and the smallest population in the showing area is in community E which comprise 1 school which is Okeose.

4.3 POPULATION RATIO PER LOCATION

From the table 4.3 , we have total number of (17) seventeen schools for the distribution analysis within the part of the study area in different locality; we observe their some locality has more than one school. The population of each location (community) is based on population projection for 2025 using the population census of 2006

Note: - the last census was conducted in 2006 and to estimate the population for 2025, we employed the compound annual growth rate (CAGR) method. This approach assumes a constant growth rate over the specified period.

The population of local government per yearly growth rate of 3.41% and the formula use to calculate 2025 shows above;-

$$P = P_{\circ} \times (1 + r)^{n}$$

Where P = final population

$P_{\circ}$ = initial population

r = growth rate (3.41%)/year = 0.0341

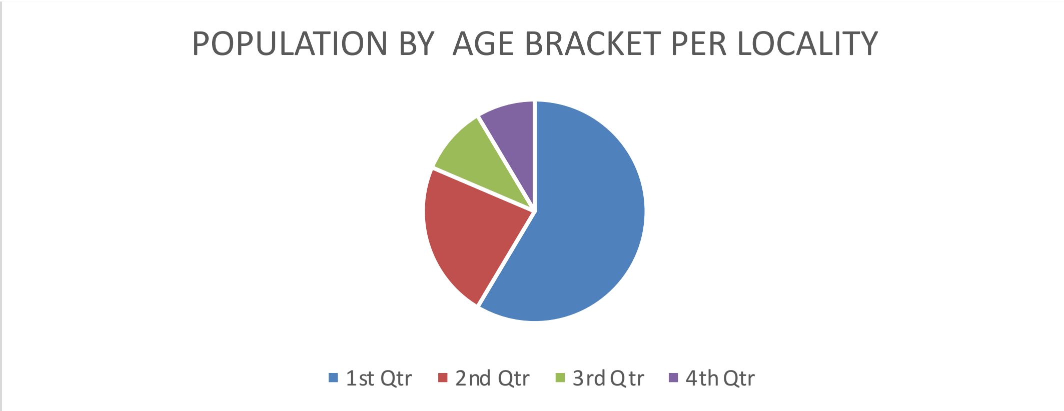
n = numbers of year (2025 - 2006 = 19 years)

Table 4.3: Population Census per Locality 2006 & 2025 Approximate population projection Records

S/N	NAME OF LOCALITY	2006 CENSUS	APPROXIMATE POPULATION BY 2025 CENSUS	CHILDREN (42%) OF POPULATION 3YEARS TO 18YEARS 2025 PROJECTION	ADULTS (54%) OF POPULATION (2025 PROJECTION)
1					
2					
3					
4					

5	Ilorin East local government	207,462	392,307.68	164,769	211,846
6					
7					
8					
9					
10	Moro local government	108,715	205,578.50	86,343	111,012
11					
12					
13					
14					
15					
16					
17					

Source: Field Observation Data, Author, 2025



4.4 EXPECTED ENROLLMENTIN RELATION TO SCHOOL POPULATION

From the table below, we have total number of (17) seventeen schools for the distribution analysis within the study area; some locality has more than one school. The population of each location (community) was projected from the Population Census of their respective local government

Table 4.4: Expected Enrollment in Relation to School Population

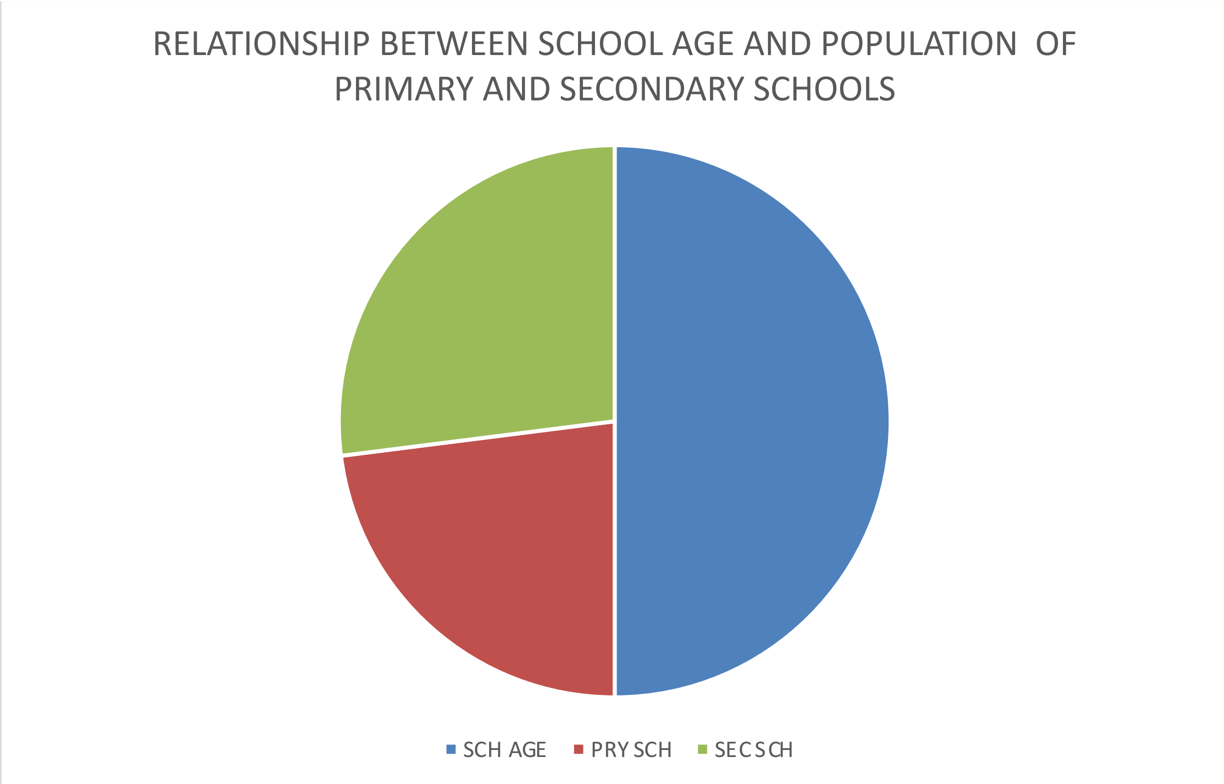
S/N	LOCALITY	NAME OF SCHOOLS PER LOCALITY	2006 CENSUS	APPROXIMATE POPULATION BY 2025 CENSUS IN THE AREA	SCHOOL AGE PER LOCALITY (PRI & SEC SCH)	SECONDARY SCHOOL POPULATION FROM REGISTER	PRIMARY SCHOOL POPULATION FROM REGISTER	NUMBER OF SCHOOL CHILDREN

1	Sango	Govt Day Sec Sch						
2	Sango	Govt Day PriSch			2,279	198	201	
3	Galiki	GalikiPri. Sch					217	**616**
4	Maya/ IleApa	Maya/ IleApaPri Sch				215	98	
5	Eleko	Eleko LGEA			1,790			**313**
6	OkeOse	OkeOse LGEA	207,462	326,923		302	106	**408**
7	Sentu	Sentu LGEA			1,157	221	-	**221**
8	NNPC	Govt Girls College			338	-	45	**45**
9	OKE OYI	C.S.S. OkeOyi			799	-	97	**97**
10	OKE OYI	LGEA OkeOyi			-	206	-	**206**

11	OKE OYI	LGEA Sch II OkeOyi			-	-	39	**39**
12	Tepatan	Tepatan Sec Sch			937	-	201	**201**
13	Tepatan	TepatanPriSch			639	-	87	**87**
14	NNPC	Sch of Special Needs	108,715	84,650		62	-	**62**
15	ELEKO	Eleko LGEA			2,588	199	-	**199**
16	KWARAPOLY	KwaraPoly Sec Sch				-	163	**163**
17	KWARAPOLY	KwaraPolyPriSch				-	102	**102**

Source: Field Observation Data, Author, 2025.

Note : - the percentage of children in school seems small compared to the expected number of children in schools. We assume the children in the locality are attending private schools



4.5 POPULATION RATIO IN RELATION TO SCHOOL CLASS ROOM AND CLASS NUMBER

From the table 4.5, we have total number of (17) seventeen schools for the distribution analysis within the part of the study area in different locality, though some locality has more than one school. The population ratio of each Class room number / population based on Ministry of Education regulation is taking between 28 Pupils and 32 Students for secondary level

Table 4.5: Population of Students in Relation To Number ofClass Room

S/N	NAME OF SCHOOLS PER LOCALITY	CLASS ROOM NUMBERS PER SCHOOL	SECONDARY SCHOOL POPULATION FROM REGISTER	PRIMARY SCHOOL POPULATION FROM REGISTER	NUMBER OF CHILDREN INCLASS ROOM
1	Govt Day Sec Sch	6	198	-	**616/18= 34.22 students per class**
2	Govt Day PriSch	6	-	201	
3	GalikiPri. Sch	6	-	217	
4	Tepatan Sec Sch	6	215	-	**313/18= 26.08 students per class**
5	TepatanPriSch	6	-	98	
6	Sch of Special Needs	6	302	106	**408/6=68 students per class**
7	Olokuta Sec Sch	6	221		**221/6=36.86 students per class**

8	Maya/ IleApaPriSch	6	-	45	**45/6= 7.5 students per class**
9	Eleko LGEA	6	-	97	**97/6=16.17 students per class**
10	KwaraPoly Sec Sch	6	206	-	**206/6=34.33 students per class**
11	KwaraPolyPriSch	6	-	39	**39/6=6.50 students per class**
12	OkeOse LGEA	6	-	201	**201/6=33.50 students per class**
13	Sentu LGEA	6	-	87	**87/6=14.50 students per class**
14	Govt Girls College	6	62	-	**62/6=12.75 students per class**

15	C.S.S. OkeOyi	6	199	-	**199/6=33.16 students per class**
16	LGEA OkeOyi	6	-	163	**163/6-=27.12 students per class**
17	LGEA Sch II OkeOyi	6	-	102	**102/6=17**

Source: Field Observation Data, Author, 2025.

Note: - from table 4.5 it is discovered that the school in the special need has a higher student concentration of 68 pupil per class, while kwara poly primary school has the lowest pupil per class.

4.5 ANALYSIS OF THE RESULTS

The following are the results derived from field data and other secondary data obtained from reliable sources:

1. The study area can be literally divided into two (2), the urban and rural community.
2. The community tapped ‘A’ falls under the urban community while the rest can be termed rural.
3. It is observed that the schools enrollment within the urban community is much higher than the rural (sango, ganiki and school of special needs).
4. However for both, the class enrollment seems small compared to the estimated population.

5. Some reasons that could be adduced to this may be found in the restricted sample of our research, that is, government schools alone.

6. Similarly, the rural community appear averse to sending their children to school. They prefer farming.

7. Also there seems to be more classroom spaces than the number of pupil in the classes.

8. Apparently it can then be concluded that the distribution and availability of government school within the study area is adequate but the enrollment is less than adequate.

9. This probably may be as a result of preference of parents for private schools than government schools.

CHAPTER FIVE

5.0 SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 SUMMARY

The project is focused on the application of GIS as a tool in creating Government Schools Information system. The acquisition of data was carried out using Dual Frequency GPS while the attribute data was done through social survey. The construction phase and the design of data model were achieved with relational data structure using ArcGIS software.

It has been demonstrated beyond reasonable doubt that the use of GIS in Government Schools distribution network cannot be overemphasized. The fact is that GIS take care of very large volume of data, it can be use for updating, storing ,processing , analyzing, presentation of information and quick retrieving of data when needed and at required scale if it is a map and therefore facilitate quick decision making.

GIS also show how to design, create, and use database for effective Government Schools distribution network and managing the facilities by exploring GIS capabilities in linking both the spatial and non-spatial data in time which helps in data analysis and decision making.

5.2 CONCLUSION

The database created would go a long way in assisting the body responsible for Government Schools distribution to have a quick access to information per time regarding the estate hence making decision even right from the office will be easier as the database provides timely, accurate, and easier way of acquiring information, which is very important in taken accurate decisions necessary in the economic development of any enterprises. More effort should be made to bring in such refined and scientific approaches. The GIS would prove to be an important technology in decision making for power safeguarding.

5.3 PROBLEMS ENCOUNTERED

These are some of the challenges faced in the course of executing the project:

I. Low-Technical-How of ArcGIS gave a little challenge in data processing

II. Natural factor such as rain led into postponement of observation for some days.

III. Epileptic power supply was a challenge especially during data processing and information presentation.

IV. The resident of the study area were not cooperative in giving out the needed information about the schools

The Surveyors are known to be problem solvers, after all these all problem where tackled and solved with time.

5.4 RECOMMENDATIONS

Based on my experience and benefits hopefully derived from this project study, I hereby recommended that:-

i. Kwara State Government should employ and retain Geo-inforrmaticians that will help the organization to acquire, process, manage and present spatial data of Government Schools facilities to different parasternal involved in education.
ii. There should be an establishment of GIS department in the ministry of education all over the country and a surveyors/GIS expert as the head of the department.
iii. The database is open to review as the development within the study area increases to incorporate new Government Schools
iv. This project can be used as a reference by other researcher of same like within or outside the state

CHAPTER SIX

COSTING

The costing of this project was done using the Nigeria Institution of Surveyors (NIS) professional scale of fees for Consultant in the construction industry. The total area of the project is 39.303 hectares, the project component and their direct costs were as follows.

- RECONNAISANCE

PERSONAL/QUANTITY	UNIT RATE(₦)	DAY(S)	TOTAL AMOUNT(₦)
1 Senior Surveyor	9,814.20	2	19,628.4
1 Technical officer	6,542.80	2	13,085.6
2 Skilled Labour	4,078.66	2	8,157.32
Transportation	19,826.67	2	39.653.34
Basic Equipment	19,826.67	2	39,653.34
TOTAL			120,178

- LINE CLEARING

PERSONAL/QUANTITY	UNIT RATE(₦)	DAY(S)	TOTAL AMOUNT(₦)
1 Assistant Surveyor	6,540.80	1	6,540.80
1Assistant Technical Officer	4,673.43	1	4,673.43

6 Labour crew	12,235.98	1	12,235.98
Transportation	19,826.67	1	19,826.67
Basic Equipment (6)	19,826.67	1	19,826.67
TOTAL			63,103.55

DEMARCATION

PERSONAL/QUANTITY	UNIT RATE(₦)	DAY(S)	TOTAL AMOUNT(₦)
11 Beacons	23,100.00	1	23,100
1 Assistant Technical Officer	4,673.43	1	4,673.43
4 Labour crew	8,157.32	1	8,157.32
Transportation	19,826.67	1	19,826.67
Basic Equipment	5,664.00	1	5,664
TOTAL			61,421.42

TRAVERSING AND DETAILING

PERSONAL/QUANTITY	UNIT RATE(₦)	DAY(S)	TOTAL AMOUNT(₦)
1 Surveyor	9,814.20	8	78,000
2 Assistant Surveyor	13,085.60	8	104,684.8
6 Labour crew	12,235.98	8	97,887.84
Transportation	19,826.67	8	158,613.36
Basic Equipment	28,323.80	8	226,590.4
TOTAL			665,776.4

DATA EDITING AND PROCCESING

PERSONAL/QUANTITY	UNIT RATE(₦)	DAY(S)	TOTAL AMOUNT(₦)
1 Principal Surveyor	13,085.60	3	39,256.8
1 Surveyor	7,944.83	3	23,834.49
1 Assitant Technical Officer	4,673.43	3	14,020.29
Computer Accessories	21,242.85	3	63,728.55
TOTAL			140,840.13

- PLAN AND MAP PRODUCTION

PERSONAL/QUANTITY	UNIT RATE(₦)	DAY(S)	TOTAL AMOUNT(₦)
1 Chief Surveyor	14,487.62	1	14,487.62
1 Surveyor	7,944.83	1	7,944.83
1 Secretary	6,542.80	1	6,542.80
1 Computer	10,000.00	1	10,000.00
Consumable	6,000.00	1	6,000.00

PERSONAL/QUANTITY	UNIT RATE(₦)	DAY(S)	TOTAL AMOUNT(₦)
1 Senior Surveyor	9,814.20	1	9,814.2
1 Technical Officer (CAD)	6,542.80	1	6,542.8
Standard set(Computer,plotter)	28,323.80	1	28,323.8
TOTAL			44,680.8

Technical report

TOTAL			44,975.25

- SUMMARY OF THE COST RATE

ITEM	PROJECT QUANTITY	UNIT RATE(₦)
1	Reconnaissance	120,178
2	Land clearing	63,103.55
3	Demarcation	61,421.42
4	Traversing and detailing	665,776.4 1,140,975.55
5	Data Editing and processing	140,840.13
6	Plan and map production	44,680.8
7	Technical report	44,975.25
8	Accommodation	225,000
11	VAT 5%	57,048.78
	TOTAL	1,423,024.33

The total Estimated Cost of the project =1,423,024.33

(One Million Four Hundred Twenty Three Thousand Twenty Four Naira and Thirty Three Kobo)

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