Creation of Cadastral Information System for Part of Oluyole L.G.A Oyo State, Nigeria

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Abstract—The need for digital cadastral information system of part of Oluyole Local Government area in Oyo State arose due to inadequate digital information about the area as to retrial information about the study area. This realization led to the involvement of GIS, to assist in the creation, documentation, and management of land titles. Data were acquired by scanning the hardcopy layout plan of the study area, geo referencing and digitizing. While non spatial data were obtained through social survey, visual perception and statutory bodies. ArcGIS10.2 software was used to perform the GIS operations of storing, processing, manipulating, analyzing, displaying the required information. The results of database queries were presented in form of digital maps (thematic maps) showing the existing allocation patterns of parcels in the study area, and database table showing detailed characteristics of such parcels, amongst others. It is recommended that the State Government to create a database for all landed properties in the state, embark on enlightenment program for parcel owners to understand the importance of digital cadastre so as to have accurate information of parcel owners amongst others.

Keywords— Information System, Nigeria, Oluyole.

I. INTRODUCTION

The traditional method of data management has proved to be inefficient and cumbersome. It is faced with problems such as redundancy (the unnecessary repetition or duplication of data), high maintenance costs, and difficulties in moving from one system to another, the possibility that enhancements and improvements to individual files of data will be made in an ad hoc manner, difficulties in data sharing, lack of security and standard, lack of coherent corporate views of data management. The layout plan and records of National union of Food Beverage and Tobacco employee layout are in analogue format. Updating the records of the estate in this analogue format is relatively expensive and time consuming.

There is little or no flexibility in handling the information of the estate in this analogue format. Therefore the best way to minimize these enormous problems is the comprehensive application of Geographic information System (GIS) in plan production and record keeping in other to facilitate its future updating with modern technique. Hence the creation of digital cadastre of National union of Food Beverage and Tobacco employee layout, Ibadan**.**

II. STUDY AREA

National union of Food Beverage and Tobacco employee layout in Oluyole Local Government Area of Oyo state was chosen for the study area. The layout covers an approximate area of 50.186 hectares of land with latitude $7^0 18'37''$ to $7^0 18'51''$N and longitude $3^0 47'19''$ to $3^0 47'33''$E. The land area of the estate was acquired and designed in 2013 with plan no OY/2263/2013/55 BLK A-N of Ibadan capital city.

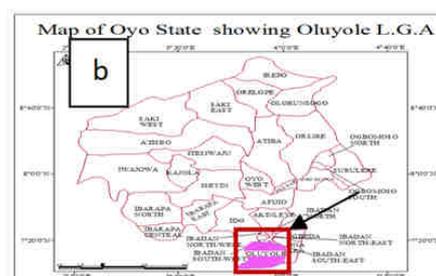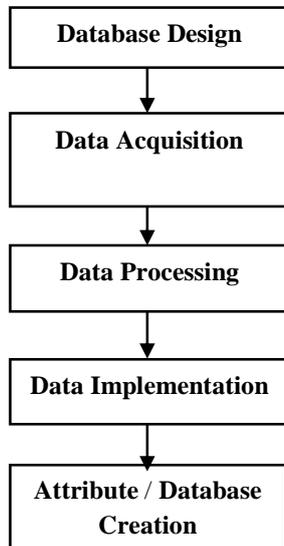
Fig.1(a): Map of Nigeria showing Oyo State,

Fig.1(b): Map of Oyo State showing Study Area

III.   METHOD

The method used in this research is shown in figure 3

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│     Database Design     │
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┌─────────────────────────┐
│     Data Acquisition    │
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┌─────────────────────────┐
│     Data Processing     │
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┌─────────────────────────┐
│   Data Implementation   │
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┌─────────────────────────┐
│   Attribute / Database  │
│         Creation        │
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3.1 Database Design

The creation of a structured, digital database is the most important and complex task upon which the usefulness of the cadastral information system depends. Database design is the process of producing a detailed data model of a database (Hernandez, 2012). The design phase consists of three levels (Kufoniyi, 1998):

a) Conceptual Design
b) Logical Design
c) Physical design
a. *Conceptual Design*

Conceptual design is the first step in database design where the contents of the intended database are identified and described. It deals with the identification of the basic terrain objects together with the spatial relationship that exist among them. It is human-oriented, often partially structured, model of selected objects and process that are though relevant to a particular problem domain. Conceptual design is carried out independent of the software and hardware that will be used to implement the database.

Since parcel is the main focus of this research, vector data modeling was considered appropriate for this application because its best represent parcel.

b. *Logical Design*

This is another stage of the database design in which all the real world entities conceptualized were modeled into the real world using logical design. It is the representation of the conceptual design to reflect the recording of the data in the computer system using a relational database management system (RDBMS) (Effiong and Alagbe, 2012). In this phase, the entities, their attributes and their relationships were represented in a single uniform manner inform of relation in such a way that would be no information loss and at the same time no unnecessary duplication of data.

c. *Physical Design*

This involves the translation of the real world entities into the computer compactable forms of the chosen structuring model such as relational, geo-relational, network, and hierarchical. For this project, relational (table) structuring method was used due to its easy implementation and management.

All geospatial and non spatial (attribute) data were structured and actualized to form a database in a format acceptable by the implementing software and hardware. Thus, point, line and polygon layers were created for spatial objects on the digital map. Attribute data needs of the database were also structured as shown in the following tables.

3.2 Data Source

The primary data collected include the coordinates of some pillar around the study area of known description for the purpose of geo-referencing the plan.

The secondary data used include a hard copy layout plan of the project area and attributes of the plots.

3.3 Data Processing

The layout plan of the project area was scanned and then exported to ArcGIS 10.2 for georeferencing and digitized, so that spatial analysis would be performed. Attribute data were used for the creation of spatial database. These data were processed and queried to provide useful cadastral information.

IV.   RESULTS

The major spatial attribute results in the study area are shown in figures 4.0- 4.5. These spatial queries were classified as single criteria queries and multiple criteria queries. The major queries includes parcels that are allocated to a female occupants in the layout, parcels data are used for commercial purposes in the layout, parcels with an area less than 450sqm in the layout.

4.1 Query to show parcels that are allocated to female occupants in the layout.

Fig.4.1: Query of parcels that are allocated to female occupants in the layout.

The query result (figure 4.1) shows that 17 out of the 257 land parcels were allocated to female occupants.

4.2 Query of parcels that are used for commercial purposes in the layout.

Fig.4.2: Query of parcels that are used for commercial purposes in the layout.

The query result (figure 4.2) shows that 13 out of the 257 land parcels were being used for commercial purposes.

4.3 Query of parcels having an area is less than 450sqm in the layout.

Fig.4.3: Query of parcels having an area is less than 450sqm in the layout.

The query result (figure 4.3) shows that 123 out of the 257 land parcels had an area less than 450sqm.

V.   SUMMARY AND CONCLUSION

This research intends to create a digital cadastre for part of Oluyole local government area, Oyo state using National union of Food Beverage and Tobacco employee layout, Ibadan as a case study.

The successful implementation of land administration and management is a predicate on the effective implementation of the technical strategies and structure considered in this research. The research has successfully demonstrated the use of GIS in Cadastral Management of National union of Food Beverage and Tobacco employee layout. The capabilities of information system in GIS to conduct spatial search and provide answer to some generic question has been established. The database created was carefully accessed and tested with various queries invoked. The information generated can assist in decision making in cadastral management and land administration by various authorities involved.

VI.   RECOMMENDATION

Due to the discovery during the execution of the research, the following recommendations are made:

1. There should be an enlightenment programme for the parcel owners to understand the important of cadastral information system so as to have accurate information of parcel owners.

2. It is advisable for State Government to create database for all landed properties and updating of such information.

3. GIS technology should be employed in the creating cadastral information system to enhance effective and efficient cadastral management.

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