

Creation of Cadastral Information System of Asade Estate, Abuja Nigeria

Emengini E.J., Akpata Sylvester., Ejikeme J.O

Department of Surveying and Geoinformatics, Nnamdi Azikiwe University, Awka, Nigeria

Abstract— Cadastral information system is an organized system that records land information, holdings and describe the spatial and non-spatial entities of parcels and land information. It has the ability to record, store, update and retrieve at will when necessary, all land related information. This study makes use of the spatial information of the perimeter, the designed layout and parcel spatial and non-spatial data to implement the system. The perimeter survey was carried out using KOLIDA 445R Total Station and plotted using AutoCAD land Development 2009, the designed layout was scanned and digitized in ARCGIS 10.1 for automation process. The parcel information, data analysis, query optimization and implementation were designed and store in ARCGIS. The system was tested and suitable in solving the challenges of demolition of built structures due to non-conformity of built structure with the standard set by the building regulating agency and the issues of fake lack documents by land racketeers. The information of all parcels including the prototype of buildings categories are specified and store in the database.

Keywords— Cadastral Information System, KOLIDA 445R, Abuja.

I. INTRODUCTION

Land demand in urban area like Abuja is on the increase daily. It is based on this that people struggle to acquire land by all means. This quest has led to forging of land document and racketeering of the available land. This is the reason for the establishment of Abuja Geographic Information System (AGIS), which is to check and monitor land acquisition and allocation in Abuja. The system has not been implemented in all the districts and area councils. A developed Cadastral Information System (CIS) could help store land related information in a digital form (Igbokwe *et al* 2015, Michael *et al* 2010, Jens and Markus 2012).

Cadastral Information System (CIS) is a legalized, sophisticated, efficient and more effective means of capturing, managing (processing) and presenting information on land using the computer system. The benefits of CIS to national development are of great interest

to government and estate developer. This is so because the system help in generating revenue for the government and a tool of storing information about land for public and private sector as was discussed in previous review (Kemiki *et al.* 2015, Orisakwe and Bakari 2013, Babawaro 2010, Wolfgang 2001). The system requires the definition of land parcels using x and y coordinate system and documenting the attribute data of these parcel. The status of the parcel could either be certificate of occupancy and right of occupancy and was specified in the CIS. The type of expected building on each parcel, parcel's owner, address and related information are in the CIS Igbokwe *et al.* (2015). The CIS database was created in these studies using AGIS to populate the database. A cadastre could be in analogue or digital form demonstrating multipurpose cadastre. Nevertheless, whatever name you call it, a CIS and multipurpose cadastre is records of interest on land and all information on the land.

The challenge of the old analogue system which house many land documents is stressful and difficult to manage. It could result to loss of land document or even damage of these documents by rodent. The analogue system which is gradually fading out in the country has been in used for years as shown in the below figure:



Fig.1: Stacks of land files of the old system (AGIS, 2004)

Other land related challenges are ligations resulting from demolition of developed structure for individual and within an estate and revocation of estate plot by the FCT minister.

Estate developers developed structure for interested tenants who pay and take possession of choice building on out right payment or montage. When these structures are demolished or the land revoked the off takers and the developers are at loss. These problems are often challenged in the court of law and blame apportion appropriately. The issue is who bear the lost? An organized CIS designed by the government will solve all of these problems. Also, if estate developers have CIS that specified the type of building require for each parcel in its database, defaulter tenants would have no case in court (Orisakwe and Bakari 2013, Nnam *et al* 2011).

However, the issue of unsigned certificate of occupancy and delay approval of building plans is another challenge? CIS is the answer. It is a common norm in Nigeria that almost all the state Governors finds it difficult to sign certificate of occupancy even when applicant had pay full bills for the certificate. This delayed money which some time takes up to two to three years before the certificate of occupancy is sign could generate interest for the owner if put on fixed deposit account in the bank. CIS could be used to monitors these challenges by land monitoring and allocation committee and agency delegated to do so, if there exist any. Similarly, violating land use and distortion of cities master plans are reasons for demolition in Abuja. See picture below:



Fig.1.1: Picture of Demolished Building

The demolished building below is located in an estate plot and it was demolished as a result of violation of land use. A CIS for the state or a nation would have information about land and its land used as explained in previous literatures and reviews (Igbokwe *et al.* 2015, kemiki *et al.* 2015, Orisakwe and Bakari 2013, Michael *et al* 2010, Jens and Markus 2012). A central CIS that is available to the public domain will guide people to take decision on their investment on land.

The digital method of record keeping of land related information can help to solve all of land complex problem and can also provide evidence in case of litigation.

1.2 Study Area

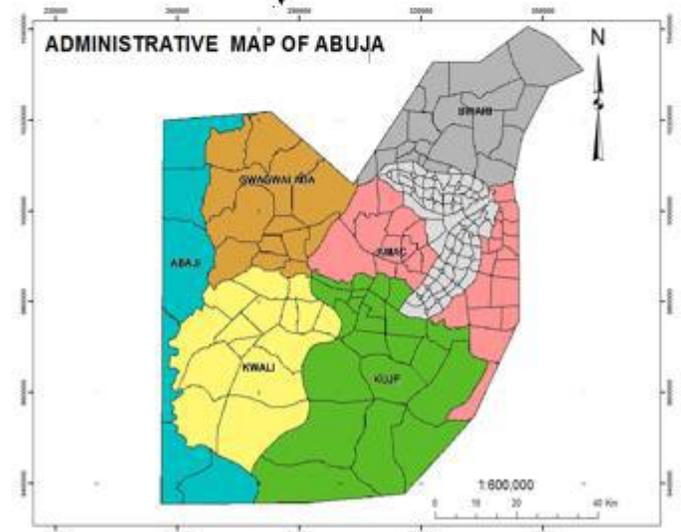


Fig.1.2: Map of the Study Area

The study area is Abuja the federal Capital Territory. It was carved out from the old Nasarawa, Kogi and Niger State in 1976 as the federal capital City of Nigeria. It is bounded by latitude $8^{\circ} 25'N$ and latitude $9^{\circ} 25' N$ and longitude $6^{\circ} 45'E$ and longitude $7^{\circ} 39'E$. It has boundary with Kogi State in the south, Niger in the north, Nasarawa in the east and Niger state in the west. The major language spoken among the people are mainly Gbagyi, Nupe, Koro, Gwandara, and

Gade. Its total area is about 724,473.9 hectares. The major food among the indigenes are mainly corn, yams, millet, beans, garri, and cassava flour, garden egg, soya beans, Mellon, okra, groundnuts and vegetables. The major occupation among the people within the study area is faming. The farm products are yams, cassava, maize, groundnuts, soya bean, millet, potatoes, garden eggs, beans, water Mellon, Mellon and vegetables. The Gbagyi's are peaceful people.

II. METHODOLOGIES

The approaches used for creating the CIS are data acquisition, processing and analysis.

2.1 Data requirement

The data used was grouped into primary and secondary data. The primary data were the spatial and non spatial data describing the location and information about parcels. These spatial data was acquired through ground survey and the attribute data was acquired through question and answer. The spatial data (location data of the parcel) are the coordinates of the boundary points which indicate the location of the parcels. The parcels boundary coordinate were acquired through automatic process. The attribute data which are non spatial information about each parcel such as parcel's owners' information, parcel sizes, purpose, status, etc. are collected through question and answer.

The secondary data were collected from the office of the Federal Capital City development Authority (FCDA),

Abuja. These are administrative map of Abuja, coordinates of controls to connect the survey and the designed layout plan of the proposed Estate.

2.2 Hardware and Software Requirement

The hardware used are Computer system, Kolida Total Station and a Scanner, while the software used in the study are AutoCAD 2009 and ARCGIS 10.1

2.3 Data Acquisition

The data for the perimeter survey of the estate was carried out using Kolida Total Station and the parcel spatial data was generated through automatic method from the scanned layout that was digitized in ARCGIS. The acquired data of the perimeter was plotted in AutoCAD and the designed layout scanned and exported to ARCGIS, georeferenced and digitized to generated data for the parcel.

2.4 Data Processing and Database Creation

The acquired data for the CIS was used to create comprehensive information for the estate. A database was created for the estate using the spatial data and non spatial data of each parcel. The CIS created, was used to defined the estate requirement for building types, information about owners of property in the estate, cost of servicing infrastructure within the estate, status of parcel (developed, undeveloped, certificate of occupancy or right of occupancy) and payment status for ground rent. The database design and modeling are represented in a float chart in figure 1, 2 and 3 below:

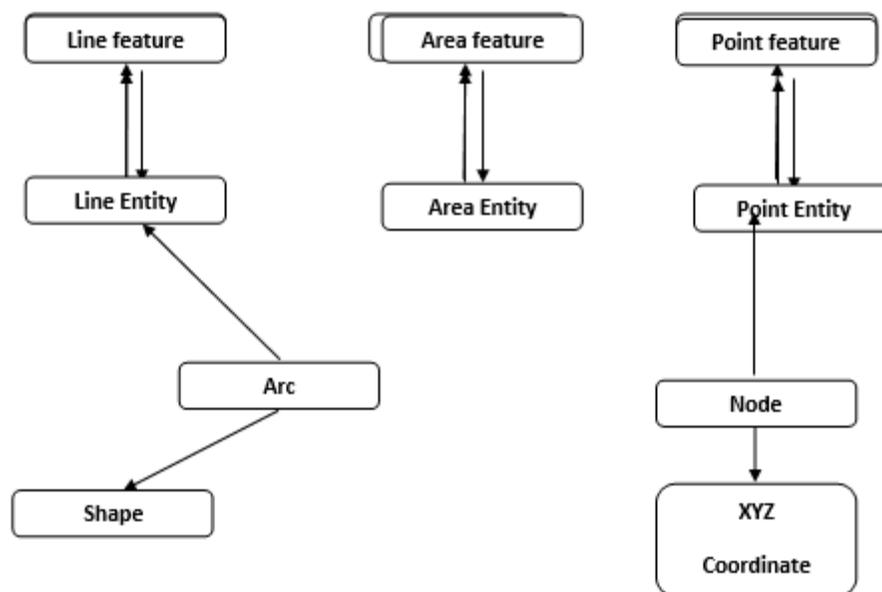


Fig.1: Vector data model, Kufoniyi (1998).

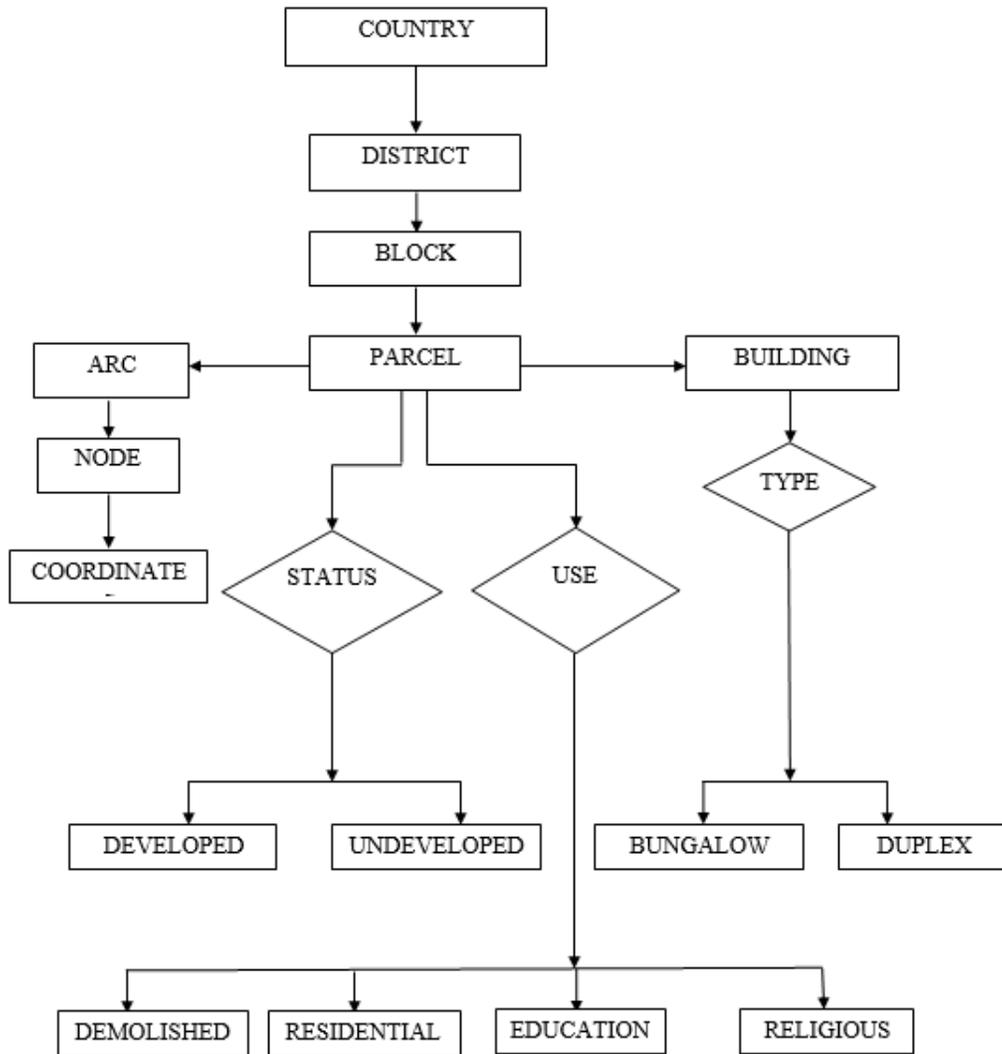


Fig.2: Entity Relation (ER) diagram of a Parcel Based Information System.

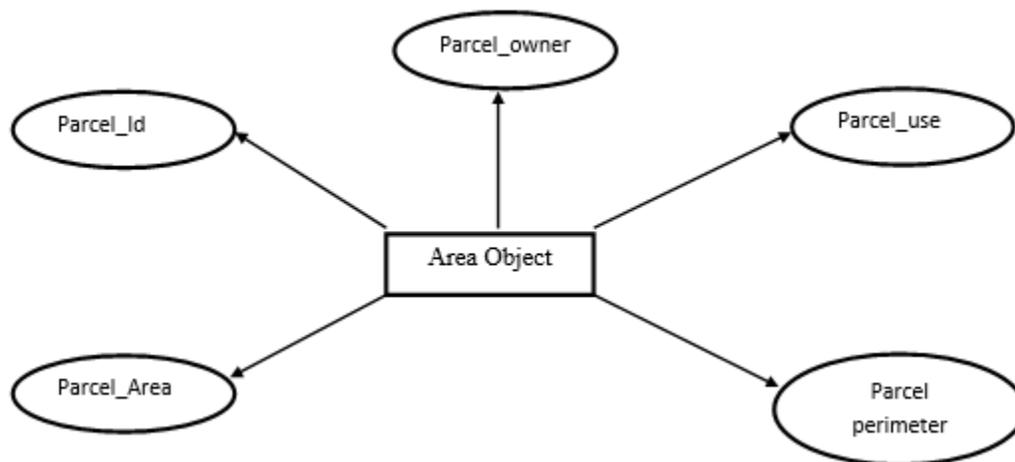


Fig.3: Area Entity (parcel) and its attributes.

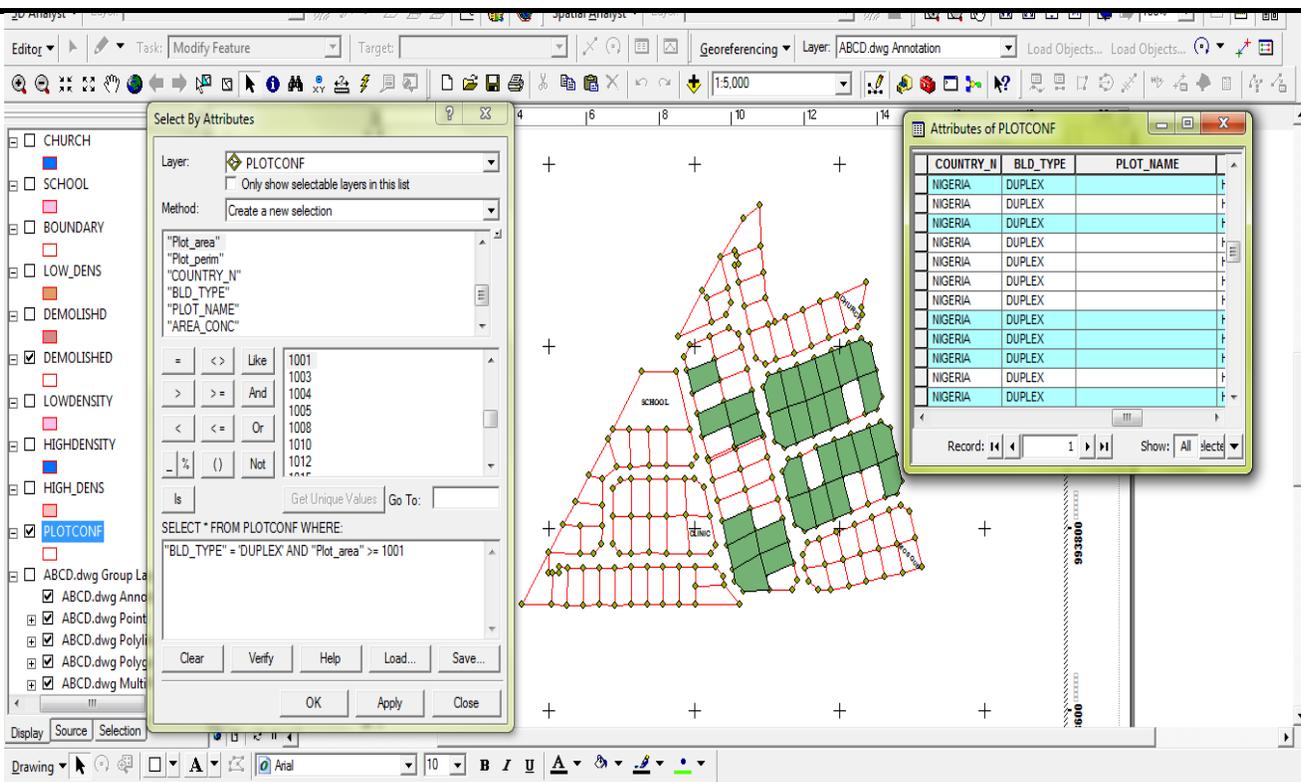


Fig.3.2: Result of query for [BLD_TYPE] = “DUPLEX” AND [PLOT_AREA] >= “100 1m²”

Table.3.1: Result analysis

Block no	No of parcels	No of bungalow	No of duplex
1	22	22	0
2	10	10	0
3	13	13	0
4	12	0	12
5	12	0	12
6	12	0	12
7	13	0	13
8	10	0	10

IV. CONCLUSIONS

The CIS created was able to achieve its major aim. The aim was to develop a CIS that will manage and control the development of Solo Real Estate in Abuja for proper management and revenue generation from land resource. The used of survey techniques for data acquisition, and database creation using ARCGIS 10.1 for data acquisition, processing and analysis was adopted to achieve the implementation of the CIS. The digital cadastral map obtained from the queries of the database shows, parcels, roads, schools, etc. and could be used in achieving the following:

- i. Efficient and Sustainable National Planning and Development.
- ii. Efficient political Administration of the nation.
- iii. Effective inventory and monitoring of the environmental resources.
- iv. Improved revenue generation by the government.
- v. Improved Health-Care, Educational and Sports.
- vi. Effective tax collection by the government.
- vii. Town planning.
- viii. Population Census.
- ix. Environmental Monitoring.
- x. Fire Protection Plans.

4.2 Recommendation

The estate developers should ensure that they implement CIS for their estate and future design should include and accommodate the fast processing of certificate of occupancy of land owners in the estate.

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