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Cadastral Surveying in Niger state, Nigeria : An overview

Barde, I. Jeremiah[a]. Effiong, E. Eyo[b]., & Gbedu, A. Mohammed[c] & Bala, M. Kuta[d].

[abc]Department of surveying and Geoinformatics, Federal University of Technology Minna
[d]Department of Estate Management, Federal University of Technology Minna
Corresponding email: bardeisa126@gmail.com

Abstract

Governments throughout the world have created and implemented cadastral systems in a unique way. These systems are intended to aid making decisions on land and property among government, industry, and society. This research seeks to present the technical aspect of cadastral practices in the department of survey, Ministry of land and housing Minna, Niger state Nigeria. Questionnaire was designed and shared to respondent which comprises of staff of the department of land survey in the Ministry and the general public. The sample size was estimated using fisher's formula to be 87. The questionnaire consist of four sections which includes: cadastral awareness and knowledge, land registration, and cadastral mapping and survey. From the field survey, it was recorded that about 45% of the respondent indicates lack of awareness of cadastral practices system while 49% of the respondent indicates not understanding the needs for deeds registration. 64% of the respondent (staff) uses handheld instruments whose accuracy is within the radius of 3m-5m to carryout survey operations. The outcomes of the research indicates a clear fact that the Niger state (Minna) cadastral practices is in serious challenges as it practices have deviated from the norm and professional ethic of the profession. However, to overcome these challenges, there is need to organize workshop especially for staff of the department of survey of the Ministry basically in two directions "Instrumentation and Mapping" and also to enlighten the general public on the relevant of survey operations in general

Keywords: Cadastral System, Cadastral Practices, Land Registration and Cadastral Mapping and Survey Operation

1. Introduction

The need for more "space" resulting from population growth, urbanization and industrialization has increased the pressure on land-use planning and development. As a result, space above and below ground level is increasingly used (Ali, 2013). Examples include underground developments, infrastructure facilities, high-rise buildings, and apartments. To extend the use and functionality of the land, complex infrastructures are being built, both vertically and horizontally, layered and stacked. These two-dimensional (2D) developments affect the interests such as ownership rights attached to the underlying land. Governments and authorities need to manage land by registering and securing land interests to utilize and develop them in a sustainable and efficient manner (Isikdag *et al.,* 2014). In the modern era, cadastral surveying plays a critical role in supporting various societal needs, including property ownership, land use planning, infrastructure development, and environmental conservation (Edward, 2019). At its core, cadastral surveying is concerned with delineating property boundaries and documenting them in a systematic and legally recognized manner. This process begins with extensive fieldwork, where surveyors use a combination of traditional tools like theodolites and modern instruments such as GPS and total stations to gather precise measurements (Dashe, 1987: Barbour et al 1982). These measurements capture the dimensions, angles, and coordinates of land parcels, which are then used to create detailed maps and plans (Agor, 2008). These maps, often referred to as cadastral maps, serve as the official record of property boundaries and are crucial for resolving disputes, conducting land transactions, and managing land resources (Carneiro *et al.,* 2011). One of the primary functions of cadastral surveying is to establish a clear and undisputed record of land ownership (Hisham *et al.,* 2015). This is achieved through the creation of a cadastre, a comprehensive public register of property boundaries and ownership details.

The cadastre includes various elements such as land parcel identifiers, boundary descriptions, ownership information, and sometimes even land value assessments (Carneiro *et al.,* 2011; Elizarova, et al., 2012). By providing a transparent and accessible record of land ownership, the cadastre plays a vital role in ensuring security of tenure, facilitating property transactions, and supporting effective land administration. In many countries, cadastral systems are integrated with legal frameworks to provide a robust mechanism for property rights management. These systems often operate under the jurisdiction of governmental or municipal authorities, which oversee the registration and maintenance of cadastral records. Legal instruments such as deeds, titles, and easements are linked to the cadastral system, providing a legal basis for land ownership and usage rights.

The registration of property rights is one of the key factors around the world that determines economic performance and business activity (Kadaster, 2010). Land administration systems assist in this context. Management of stratified land rights, restrictions and responsibilities (RRRs) is one of the most important challenges in the current land administration systems, which are equipped with cadastres that are only able to maintain 2D spatial information. Land administration systems are processes to regulate land management policies to manage land by maximizing social, economic and environmental benefits for people (Enemark, 2005). Cadastre as an engine of land administration systems plays a significant role to register property rights, restrictions and responsibilities. Niger state is cadastre system is on two dimensional (2D) survey, though it face serious of the challenges ranging from it land processing to the management stage. Part of the challenge is instrumentation for data collection, reference datum and its local reference system, land administration system. These are some of the challenges facing the system. This research intend to investigate the 2D cadastre system practices in the state capital of Niger state, Nigeria

2.0 Study Area

Chanchaga local government area (C. L.G.A) is located in Niger State, Northcentral Nigeria and has its headquarters in the town of Minna. Chanchaga LGA comprises several towns and villages which include Bako, Kangwa, Nagun, Zakwogi, Pette, Shana, Kuka, and Babeji etc. The population of Chanchaga LGA is put at 138,434 inhabitants with the majority of the area's dwellers being members of the Nupe and Gbagyi tribes (NSG, 2006).
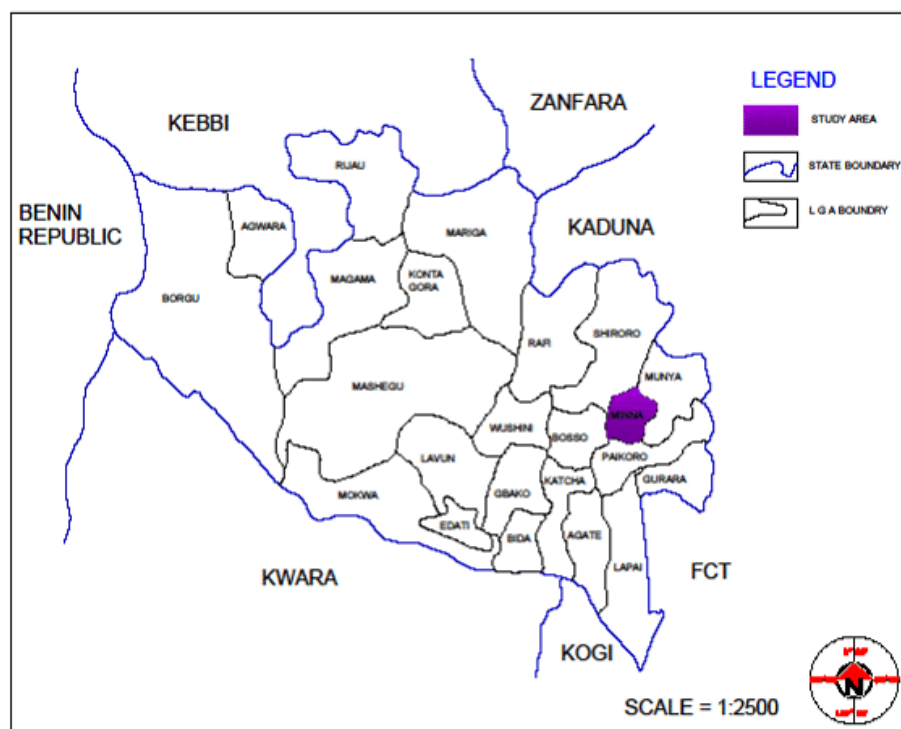

Figure 1: Map Of Niger State Depicting Chanchaga Local Government Area

3.0 METHOD

3.1 Data Acquisition

In this research work, data was collected via field survey. The instrument of data collection used in the research was questionnaires. It was administered to staff of the Ministry (department of land and survey), the researcher also interviewed some Departmental Heads of other related department such as cartography, planners and also the indigene of the local government area. This is aimed at getting wide range of information for the research. Telephone interview was also deployed in few cases where the respondents were away on official assignment. The researcher also deployed the direct observation method of data collection. The questionnaires consist of about three main section namely: cadastral awareness and knowledge, deed registration, and cadastral mapping and survey. According to Sin-Ho (2014), the sample size of the research was determined using fisher's model. Equation 1, depicts the model

$$n = \frac{N}{(1+N(e)^2)} \qquad\qquad 1$$

Where:

N: Total population
n: Minimum sample size required
e: Standard normal deviate at 95% confidence level, 1. 96 from the normal distribution.

The total number of 87 respondents was recorded out of two hundred questionnaire shared. However, some of the questionnaires were not returned not filled, some were not properly filled while some were turn off. The data were presented and analyzed using simple percentages/pie charts and content analysis techniques respectively.

4.0 Results and Discussion

The result obtained from the distributed questionnaires were discussed in this chapter. The researcher concentrated on three measure issues amidst others, associated with cadastral practices in the state. These issues seems as most pressing as at the period of compiling the research work. Below are list of the major issues.

i. Cadastral Awareness and Knowledge:

The outcome from the field survey indicates that 45% of the respondent from the LGA and other staff member of the Ministry do not know what cadastral system of land management and administration is all about neither do they have knowledge of the system. Figure 4.1 depicts the data representation from the field survey.
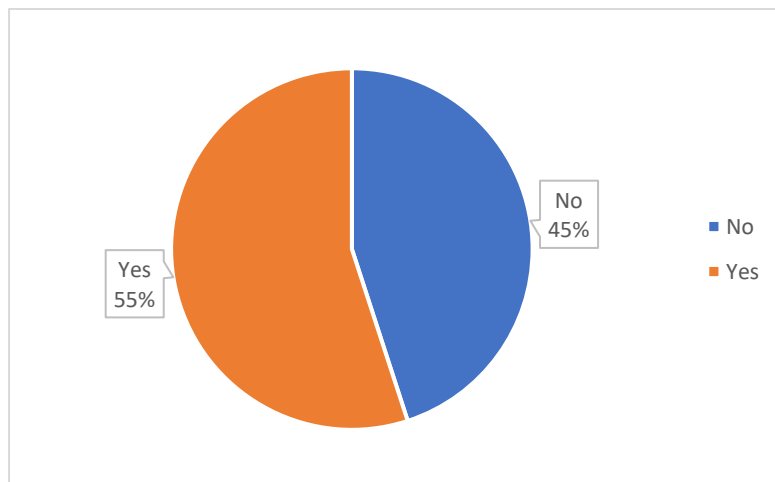

Figure 4.1 Percentage of Cadastral awareness in the state capital

Figure 4.1, the outcome of the graph shows the level of awareness of survey practices in the Minna, state capital. Nothing is essential to people's lives as the land and everything connected with it. Land is an independent asset which supports our overall existence and without which no living thing would have been on earth Dale (1991), this has stress the need for cadastral knowledge to the people. Also, Yinka and Olamide (2020), the maintenance and management of cadastral system is an important issues that increase the internal generated revenue of a country if only the relevance information is shared about it tenure system. There is need for the surveyors land administrator and management officers to go around the nooks and cranny of the state to enlighten indigene on matters that has to do with land management.

ii.   The Deed Registration:

Land registration can be described as 'the process of recording legally recognized interests (ownership and/or use) in land' (Dale and McLaughlin 1989). This process forms an important part of the system of land registration. Figure 4.2 shows the percentage of people in the state that their land are registered with a certificate of occupancy (C of C).
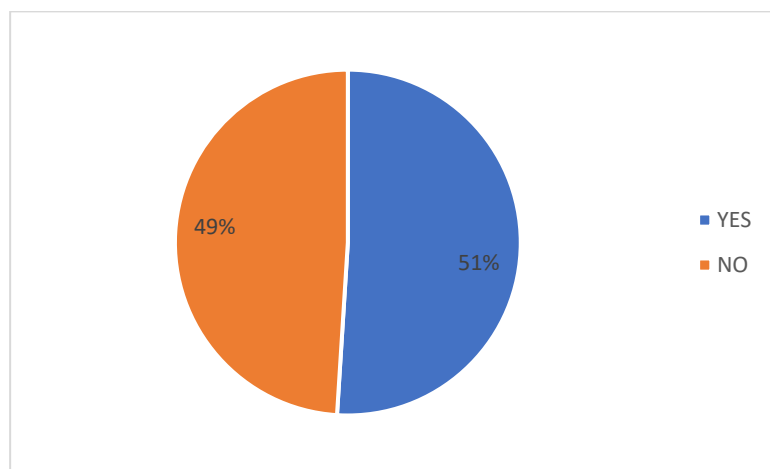

Figure 2. Percentage Responded to Deed Registration

This is a clear fact that the awareness ratio of deed registration in the state capital is poor. 49% of the structures (buildings) do not have deed registration. The amazing fact here is that, this figures are recorded in the state capital, how about in other local government areas. This could tell the amount of under-tax revenue the state is losing from land properties tax. Ezekwere *et al.,* (2022), land taxes improve country growth by 23.06%. This shows the need for the government to collaborate with the ministry of land and survey to implement policies that will ensure all land properties owners to fulfilled land registration processes.

iii.   Cadastral Mapping And Survey

The survey registration council of Nigeria (SURCON), clearly stated the specification for cadastral survey measurement as follows. (See table 4.1), At semi-major axis 95% eclipse error should have the following specification.

Table 4.1. Specification for cadastral measurement by SURCON

Cadastral Error	Tolerance level
Linear measurement	$1:10,000$
Angular measurement	$^1/_{3600}\ of\ a\ degree$
Closure	$1:10,000$

Source: SURCON, (2020)

Table 4.2 Cadastral Measurement Specification for United State of America.

Cadastral Specification

Less than 0.025 (m)	Cadastral Project Control
Less than 0.050 (m)	Cadastral Corner Measurement

<div align="center">Source: US, GNSS (2020)</div>

The outcome of the field survey is disturbing. It recorded that about 64% of the respondents depicts that handheld GPS are mostly used by the staff of the department of survey to carryout survey measurement. This is far against the SURCON specification (see table 4.1 and 4.2). Figure 4.3 shows the graphical representation of outcomes from field survey. Mostly, handheld instrument are implore for reconnaissance survey to pick the predicted location of features not the actual. Consequently, handheld GPS accuracy are within the radius of 3-5m of the location of point (kamruzzaman *et al.,* 2014).
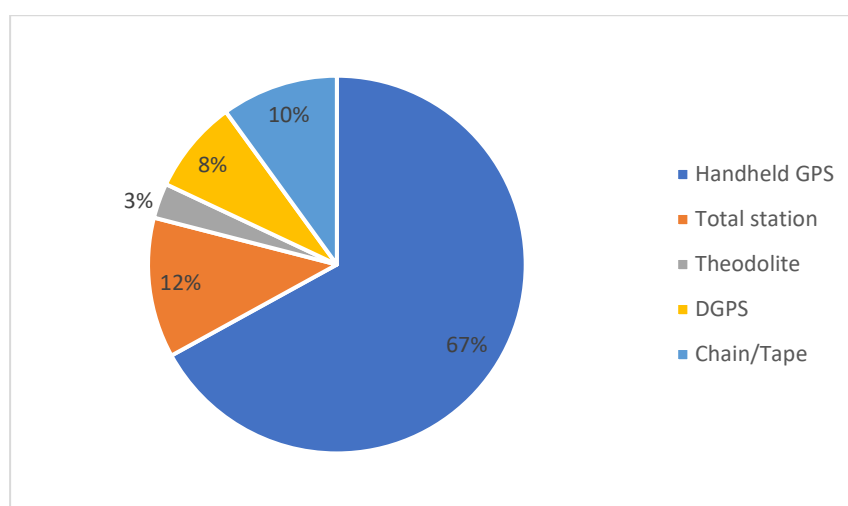

Figure 4.3. Instrument for Site Measurement.

Using such instrument for final survey could be disastrous as it can introduced error of more than 2m. The extended effect could result to Land dispute, boundary problems, community clashes, imbalance charting of the base map are some of the issues that are associated with going against the SURCON specification.

5.0 **Conclusion**

The major problem of the implementation of Cadastral Information System (CIS) in Nigeria is identifying land use pattern and modeling the user's requirement such that the system will be capable of answering some questions such as "where is what" and "what is where" Adeoye, (1998). The need for the development of these models became necessary so that the digitally acquired data could be modeled for storage in a database. CIS has received a boost over time and considering the emphasizes placed on information management, every effort must be made by concerned organization in implementing the cadastral land information system for better land management in Niger State.

However, Cadastral surveying system in Niger state require a complete overhaul. Acknowledging the fact that it generate revenue for the government and it also support the economy of the state if properly harness. The outcome of the research indicates that there are serious challenges facing the practices and the profession in the states. The department of survey and mapping needs to collaborate with the government to make stringent policies in regard land procurement process. Most importantly, there is need to create awareness to the public on why all land properties need to have deed registration. Standard of operation of practices need to be adhered to. These calls for training of the staff of the department of survey and mapping, exposing the staff of the department on how to operation survey equipment such as total station, differential global positioning system (DGPS) etc and the need to adhered to professional ethic of the profession.

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