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Digitalization of Land Records through Geographic Information System: An Imperative for Reliable Efficient and Effective Land Administration in Borno State, Nigeria

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ABSTRACT

With development of the globe, the need for information technology such as GIS, DATABASE in most administration system including lands. Become crucial, Geographic Information System (GIS) is a configuration of computer hardware, software and data specifically designed to capture, process, analyze, manipulate, edit store, retrieve and display spatially referenced information. Being a computer-based system, GIS is a robust, reliable and versatile technology that can be use and adopted in managing both spatial and attribute data in text and graphic form thereby making it most suitable for land administration and other related purposes. This write up postulated that the analogue (pen and paper) which is present manual system of processing land records such as filing, recording, storing and retrieval of information relating to land administration can no longer be held continuously in this era of technological development where information technology become the vital tool of any administrative system. To go again backdrop of globalization in the term of information technology of this era of technology, land administration, land management, land ownership and land development become the most important subject concern, where there need of facilitating land administration system and process such as timely registration, ensuring security of tenure, availability of land information, simplification of application process, transparency, facilitating of property market, minimizing corruption index, efficient land market, system of reference and information for land policy design etc. perhaps this facilitation will become achievable by use of GIS technology in land administration of state ,

1. Introduction

Land in borno state of Nigerian, is seen from the same view as other parts of the world sees it, that is land is solid lower part of earth crust which is a unique resource of fixed location, incapable of expansion in supply (except in cases where, marginal increases have been made through reclamation or other means of ownership) and it is transferable in ownership.

With potentiality of each and every development mount to land, how valuable is attached to survival of man and the deals encompasses in land it become the national alarm that necessitate for reliable, efficient and effective management of this limited resource, of which is paramount importance.

Both land administration and management involve land allocation, land registration, transfer and change of title, change of use and other land information processing, of which it has been recognized that improvements to land administration via geographic information systems (GIS) are vital catalysts for transformation development in a developing and less developed areas. This (stand) position is recognized by the Global Strategy for Shelter for the Year 2000 (UNCHS, 1990) which recommends the adoption of GIS and establishment of efficient land registration as a priority area of national policy action

for all countries. Successfully adopting the GIS technology in land administration in borno state is great mile achievement, toward improvement of national policy.

The importance of land to the development and survival of man can hardly be overemphasized. Land is indeed a very crucial resource to man as it provides the base for all developmental activities. In most countries of the world, land constitutes a substantial portion of a nation's wealth. Efficient management of this vital resource is therefore essential for the overall sustenance and development of man.

According to the report of the United Nations, Land Administration Guidelines that "determining, recording and disseminating information on ownership, value and use of land when implementing land management policies" as land management where land administration is it overall process (UN ECE 1996).
As stated in the studies of Akeh, G.I, Batu and Madu, MA (2014), Dale (2000) Also view land administration includes the determination (sometimes known as adjudication) of rights and other attributes of the land, the survey and description of such lands, their detailed documentation and the provision of relevant information about the land and any property attached to it.

Akeh GI, Butu HM, Modu MA (2014) Currently most of the state in Nigeria are struggling in transforming there land administration from manual to the digital, but perhaps most land administration agencies in Nigeria continue to rely heavily on the manual system of filing, recording, storing and retrieval of information relating to land within their control unit.

According to Ali Z, Shakir M, (2012) the existing manual land information system, which is entirely based on maps and records on paper formats with no cartographic standards and often out-dated information, can no longer be sustained in an emerging information society. The problems of land administration in Nigeria is further accentuated by the lack of a uniform system for land administration in the various states of the Federation due to the operation of the Land Use Act, which vests land in each state on the Governor. Thus each state has its own system and procedures for land administration making the entire country have a non-uniform system in the administration of land.

In the reviewed article of Akeh GI, Butu HM, Modu MA (2014) with title the role of geographic information system in urban land administration in Nigeria, they stipulate that Geographic Information System (GIS) therefore presents itself as a robust, reliable and versatile technology that can be used in managing land records. Although GIS has been used extensively in environmental resources management, it has had limited use in land administration particularly in developing countries. This perhaps explains why in Nigeria, many land registries are yet to implement the GIS technology. Its adoption and implementation in the management of land records through the use of GIS technology is fundamentally important for effective and efficient reliable urban land administration practice, which is crucial for sustainable development in Nigeria. Therefore in precisely adopting the use of GIS technology in the borno state land administration system will be a great achievement toward development of the state.

United Nations committee of experts on global geospatial information Management State in the studies with title The Application of Geospatial Information – Land Administration and Management (2015) that Geospatial/land information and its management are fundamental to successful land administration and the derived benefits to the economies and overall sustainable development of nations Furthermore, it is critical to the successful implementation of the Sustainable Development Goals, as it is able to provide reliable data on land, including its tenure and dimensions, at local scales. Despite substantial work being undertaken and completed on land issues by non-government organizations, professional bodies and global organizations, more work needs to be undertaken to consider the geographical information management aspect which assists considerably with land governance, land administration and management.

Therefore this paper aimed at exploring various the advantages, and development behind the adopting the use of GIS technology in land administration, to stand as yardstick of measure for strengthening the Borno government in supporting and giving more attention to the successful use of GIS Technology in land Administration, Achieving adoption of GIS technology in Borno state BOGIS on the other hand will help in ease of management, security of tenure, ease of control, reducing corruption, making the transparency in the system, help in provision of information to property market, attract land investors, help in providing development potentials, ease development control, provide reliable information for decision and policy design and many potentiality which is unrevealed by attached to the technological advancement.

2. Concept Geographic Information System (CIS)

With the definition from various scholars attempting to define GIS. Here are some of the definitions put by the scholars GIS means geographic information system where it is seen as a "set of tools for collecting, storing, retrieving at will, transforming and displaying spatial data from the real world for a particular set of purposes" (Burrough 1986). GIS is a "computer based system that provides four sets of capabilities to handle geo-referenced data: data input, data management (data storage and retrieval), manipulation and analysis and data output" (Aronoff 1995). Star and Estes (1990) defined GIS as an "information system that is designed to work with data referenced by spatial or geographic co-ordinates". This definition though brief highlights the fact that most of the data that the GIS uses are geo-referenced data. That is, data tied to some geometric coordinates on the surface of the earth.

Tomlin (1990) views GIS as a "configuration of computer hardware and software specifically designed for the acquisition, maintenance and use of cartographic data" This definition undoubtedly reveals one of the unique functions of GIS which is map making. Hence, GIS is perceived to be an advanced cartography. According to the Environmental Systems Research Institute (ESRI, 1990), a GIS is an "organized collection of computer hardware, software, geographic data and personnel designed to effectively capture, store, update, manipulate, analyze and display of all forms of spatially referenced information". On the other hand, Fabiyi (2004) describes GIS as a "unique integration of computer hardware, software, peripherals, procedural techniques, organizational structure, people and institution for capturing, manipulating, storing, analyzing, modulating, modeling and displaying geographically referenced data for solving complex human related problems".

From the analysis of the above definitions, it is obvious that GIS is a computer-based system that is used for mapping and analyzing spatial features on the earth's surface. It is also indicative from the various definitions that GIS is an interdependent system consisting of the following components namely computer hardware, software, geographic data, expertise and procedures. No component can operate in isolation of the other and a careful integration of all is vitally important for the successful functioning of GIS.

Although most definitions tend to emphasize one type of data that is inherently unique to GIS, which is spatial data, there is another type of data known as attribute data. The attribute data gives descriptive information or characteristics of spatial features or geographical entities held in the spatial database. The attribute data is usually maintained in a relational database and linked to the spatial data. The real power of GIS lies in its ability of using spatial and statistical methods to analyze attribute and geographic data with a view to providing graphical and textual information that can aid prudent decision making.

3. The Functions of GIS in Land Administration

The Land administration essentially entails a number of processes meant at ensuring that land rights are properly delineated and recorded. It involves all those processes whereby information relating to land ownership, land use and land value are properly documented and reprocess. Generally, these processes often result in large volumes of information that need control process that will en-cooperate with technological development. This such information are bound to subjects such as master plan, land use plans, detailed site development plans, engineering infrastructure as well as other survey information, records of allocation (name of allottees, plot numbers, plot sizes, use and locations), records of all transaction such as power of attorney, deed of assignment, mortgages, subleases, releases, devolution and so on. All these information are practically difficult to manage using the traditional/manual approach. Where it call for the modern means of the control, That is used of GIS technology where it is seen in many developing countries and even some state in the country.

GIS, being a digitalized system, has capabilities in handling such huge amount of data in a manner that is not only effective, but efficient, secured, faster and transparent. Data handled by a
GIS can be spatial or attribute data. Spatial data relates to data that has locational or positional identity with respect to the surface of the earth while attribute data describes the characteristics or qualities of spatial features. This implies that a GIS may have a property parcel described in its spatial database and qualities such as its land use, ownership, property valuation and so on in its attribute database. Akeh GI, Butu HM, Modu MA (2014)

Adamu (2012) outlined some advantages of digitalization of land administration systems via GIS technology that it will help in Providing public access to information relating to land, Increasing the speed of processing title and reducing time and cost in the process of obtaining title to land, Entrenching transparency in land administration practices, Integrating land record information with other services, Simplifying application forms and processes, Controlling of double allocation and un-authorized use of land, Reducing the influx of illegal intermediaries and Improving collection of property taxes.

Gilo, (2013); and Egbenta, Ndukwu & Adisa, (2012) postulate that the adoption of GIS technology can potentially lead to the development of effective, efficient and reliable organized land markets, guarantee tenure security among land owners, increase revenue generation by government, reduce disputes among land owners as well fostering prudent land management by establishing efficient system of land administration.

Siriba and Farah, (2014) Digitalization of land information system through GIS is therefore seen as the most appropriate technology in the reformation of cadastral systems and land administration all over the world.
According to Nuhu (2009), GIS is one of the modern methods that could be used in the digitalizing of land records as well as enhancing the process of land registration in Nigeria. This underscores the reason why many states governments in Nigeria are beginning to adopt GIS in their land administration processes. With the success story of the Abuja Geographic Information System (AGIS), Nasarawa state geographic information system (NAGIS) and other states such as Lagos, Niger, Bauchi, Benue, Cross River, have also established their respective GISs.

4. Advantages of Using GIS in Land Administration

In the study of Akeh GI, Butu HM, Modu MA (2014) it was clearly enumerated that the adoption of GIS for land administration purposes will undoubtedly bring a lot of benefits and promote sustainable national development in the country. Some of the notable benefits have been outlined below:-

i. A GIS based land administration system will facilitate data processing, storage and retrieval of land records and provide secured geospatial data infrastructure for all land matters.
ii. It will facilitate easy completion of land registration processes which at the moment takes longer time to complete in most states of the federation;
iii. Guarantee secured land rights to land owners since details of all land parcels will be captured in the GIS spatial database. According to UNECE (1996), there can be no sustainable development without secured land rights.
iv. GIS land- based titles are considered secured hence provide security for credits for land owners by banks. This has a value added chain particularly in the housing, construction and financial sector;
v. It will decrease the cost and space required for storing land records. Depending on the hardware and storage capability of the computer, a whole lot of data can be stored in them with backups made in case of system breakdown. The wear and tear of graphical information such as maps and layouts can be eliminated completely.
vi. Since each land parcel is unique in its location having distinctive geographic coordinates, the issue of double allocation of plots as is common with the current practice will become a thing of the past. Hence the system will engender transparency in land administration system;
vii. Increase revenue to government through the re-validation of titles by land owners, consent fees, deed of assignment, deed of mortgage, deed of lease, power of attorney, sales of hardcopy maps etc.
viii. GIS allows for spatial and attribute query as well as spatial searches through a very effective and efficient Database Management System (DBMS) embedded in the GIS infrastructure. It will ease property searches and facilitate land transactions. The long period of time it takes to verify title to land will be drastically reduced. Search fees paid in the process will also yield revenue to government.
viii. It will encourage land transactions in the formal markets since every potential buyer will want to verify from the GIS whether the title to the land is genuine and free from any encumbrances. Without reliable registers, transaction in land is often costly, time consuming and uncertain.
ix. The system will reduce to the barest minimum cases of land disputes. The GIS records all the particulars of the owner of a given parcel of land as well as the geometric dimension of the land parcel. By so doing, it is difficult for two people to lay claim to the same piece of land.
Integrity checks built in the DBMS ensures that database is not unduly tampered with.
x. Being a land repository, the data held in the GIS database will be of immense benefit to government for planning and developmental purposes. E.g. taxation, housing, transportation etc.

xi. The GIS allows the concurrent use of data by different users at a time. Hence, allows for information sharing among different users.

5. Advantages of Computer-Based Databases

i. Different data access methods will be possible.
ii. Data are stored independently of the application for which they will be used.
iii. Redundancy will be minimized
iv. Access to data will be controlled and centralized
v. A computer database is relatively easy to maintain and updating is possible
vi. 6 Simple query systems and standardized query languages are available.

6. Recommendations

i. The following recommendations were postulated:
ii. There is a need for the establishment of information system or Services that will be vested with the statutory powers to create a geospatial data infrastructure for land administration.
iii. Across the entire state, there is a need for employments of high GIS technology orientated staff and training of the other staff member of land registry that will involve in the administration of the system, the state government should give more consideration in term of attention and financial budget for the successful implementation of the system in the state.,
iv. There is a need for the public education before the transformation of the exiting manual record to digital system,
v. Training should be set at suspended time interval for any new improvement and update in the in order for staff to incorporate with level of technological development,
vi. High level of digital security has to be incorporated into the system to prevent data hacking issues
vii. There is a need for stable electricity supply to throughout the working hours to support the system.

7. Conclusion

The attempt made by Borno state government in welcoming the propose idea of establishments of BORGIS project to illustrate how a multi-purpose ease in land processing information, administration can be implemented and to show some of its potentials in the management and administration of land. Reliable Efficient and effective land administration depends on the availability of good, accurate reliable and timely information. This information can be guaranteed through the digitalization of land records using the GIS technology in Borno state. The manual approach of keeping land records in most land registries in the state and in the country at large can no longer be sustained in this era of information revolution due to its inherent problems.

If borno state is to appear among the force driving wheel helping Nigeria achieving sustainable development, then urgent steps must be taken to digitized its land records in the state that will help building a national land information system or service which will foster the growth of organized land markets, guarantee tenure security, reduce land disputes and increase the revenue generating potential of government.

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