African Journal of Economics and Sustainable Development
ISSN: 2689-5080
Volume 5, Issue 1, 2022 (pp. 109-125)
www.abjournals.org

A REVIEW OF LAND INFORMATION MANAGEMENT SYSTEMS

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Cite this article:

Nwafor I.V., Sado R.O., Johnnie I.P. (2022), A Review of Land Information Management Systems. African Journal of Economics and Sustainable Development 5(1), 109-125. DOI: 10.52589/AJESD-RI2X0ZQ2.

Manuscript History

Received: 25 Feb 2022

Accepted: 21 March 2022

Published: 30 March 2022

ABSTRACT: *The need to improve on a system must begin with glare lapse(s) in the existing system yearning for redress. The desire for a much better way of going about the business evokes intensive search for possible available alternatives. The process ultimately leads the relevant stakeholders to discovery or fashioning of a pragmatic model that will not only serve the purpose more effectively and efficiently but will also have the approval of the majority of the stakeholders and stand the test of time. This study provided an overview of contributions made so far on land information management systems, with the sole purpose of ascertaining the progress recorded and inherent challenges to the existing system. Nigerians suffer unnecessary delays in obtaining land title and land title information. The scenario has caused failure and abandonment of many developmental projects. A more robust and integrated land information management system that will provide timely land information for the stakeholders in Nigeria is imperative.*

KEYWORDS: Land records and title registration, physical planning, cadastral records.

Article DOI: 10.52589/AJESD-RI2X0ZQ2
DOI URL: https://doi.org/10.52589/AJESD-RI2X0ZQ2

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INTRODUCTION

Information management is critical for sound decision making in every facet of life. Harrison, as cited by Obongo (2003), opined that information is the lifeblood which flows into and out of an organization. The success of any enterprise or organization to a large extent depends on the accuracy and timing of the information supplied and its effective use. The Ministry of Lands, Survey and Town Planning especially in Anambra State, Nigeria, being the custodian of the state land wealth, should effectively tap the potentials of communication and information technology to improve on its service delivery, revenue collection and physical land use planning.

A Land Information Management System (LIMS) is essentially a computerized tool for legal, administrative and economic decision making for land use planning and development. It consists of a structured database with spatial referenced land related attributes and spatial data for a defined area as well as procedures and techniques for systematic collection, processing, updating and distribution of the data to aid in solving land management problems (Pindiga, 2012).

Currently, the world has more or less become a global village and information on a particular phenomenon at one part of the globe may be required by someone at another part, at any point in time. The need for land information computerization and land titling procedure automation is more crucial now than ever before. A functional land information management system should not only ensure that all data relating to land are consistent, correct and up-to-date but should also avail different users their required information without necessarily engaging in generation of new datasets. This entails the availability of land information to government, industry, business, academia and citizens to meet their needs through easy and simple access solutions (Akingbade, 2005).

In many countries, improvements to the existing land administration systems are driven by developments in technology. Land and property datasets grow larger in volume as population expands. Consequently, the need for a reliable means of storage and easy retrieval of land information in support of development becomes critical and ever more urgent. Both the administrators and users of land information need accurate and up-to-date data (Dale & McLaughlin, 1999).

Additionally, information technology is dynamic; new ideas and inventions are released almost on a daily basis and this should equally reflect in the land information management system. In 2007, Anambra State Government of Nigeria developed and started the use of the Land Information Management System (commonly referred to as ALIMS) hoping to reduce corruption, delays in title registration and enhanced internal revenue generation from state land management. However, challenges of the state land management are still prevalent despite the system which has remained the same. Similar stories are obtained in different states of the federation. A scale up of the existing system may reasonably solve our problem. A holistic land information management system that captures the needs of all relevant stakeholders is expedient.

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Statement of the Problem

Effective land information management not only provides the necessary information on the land title and records for the use of the stakeholders but also does that with dispatch. The current systems and practices of land administration in the states of the federation and Federal Ministry of Works, Land and Housing are mainly analogue systems. The systems are fraught with bureaucratic bottle-necks and human-engendered hiccups that inhibit timely completion of land title perfection. The systems are frustrating and seriously put off prospective investors; they invariably militate against national economic development. Though some states and the Federal Ministry of Works, Land and Housing have ventured into computerizing their cadastral records, their levels so far very much fall below what a good land information management system should provide to the stakeholders. Ukaejiofor (n.d) noted with dismay that despite the benefits of computerization of land information, only about 20% of the states in Nigeria have commenced the application of ICT in their land administration system. The need to leverage and improve on the land information management system cannot be overemphasized especially in the contemporary age of information and communication technology (ICT) driven global economy. Computerizing land administration can ensure speedy processing of first registration of title, prevention of unnecessary duplications, and facilitation of access to land-related data as well as in-built quality control measures, among others.

Securing land title in Nigeria today is still shrouded in secrecy; prospective investors outside the country can hardly contemplate investing in Nigerian real estate due to this obvious predicament. Access to land information is still very difficult and the government is invariably losing enormous revenue from the sector. The few states that have ventured into computerization of their land information system only automated a fraction of the entire sector which still makes them face challenges of delays and hiccups in processing and perfecting land titles. There is therefore a dire need in today's Nigeria to reduce the time it takes to process land titles and their documentation. The Ministry of Lands and Urban Development in most states comprises different departments which complement each other in the discharge of their core functions to the public. Improvement in their working relationships is imperative for better service delivery. But before such improvement is considered, review of present processes is very necessary. Such a review will identify the existing gaps and likely areas that require improvement. This study captures the aim and objectives of the existing land information management system and on that basis proposes recommendations of enhancement in the system that will cater for the needs of the present and future generations.

Aim and Objective of the Study

Improvements in information systems are essential due to constant changes in the ways activities and outputs are carried out and expected. Land information is very crucial for any meaningful investment; investors must determine location choice of investment and many a time, the time taken to arrive at a consensus contributes to the overall successes or failure of a project.

Delays in obtaining land information in Nigeria is a serious challenge even with skeletal land information systems in use in some states; therefore, improvement on the existing system is imperative. This study is aimed at proposing factors that should be considered based on the existing systems while articulating improvement or developing another LIM system for effective and efficient land administration in Nigeria. Other objective include:

1. To ascertain the nature of the existing land information management systems.

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CONCEPTUAL FRAMEWORK

Land Records and Title Registration

Maintenance of comprehensive and robust land records which are easily accessible by stakeholders is one of the most important issues facing governance today. "Land Records" itself is a general term and can include records such as the register of lands, Records of Rights (RoRs), tenancy and crop inspection register, mutation register, disputed cases register, etc. It can also include geological information regarding the shape, size, soil type of the land, and economic information relating to irrigation and crops (Ministry of Electronics and Information Technology India [MeitY], 2015).

Indian land records currently seek to accomplish the following across the country:

- Completion of all data entry relating to digitization of land records,
- Provision of legal sanctity to computerized Records-of-Rights (RoRs),
- Stopping further operation of manual RORs,
- Setting up computer centers at Tehsils, and
- Enabling web access.

In Nigeria, the federal government developed a land information management system which is not only a land records system but its features also include:

- A central control and monitoring of remote sites from the headquarters via the internet,
- Large data storage capacity of 10,000,000 records within an expandable system,
- Multi-user functionality: Up to 1000 users sharing same database,
- System entities are linked together within the relational database system,
- C of O to land to owner and to other transactions,
- Appropriate statistics and reports in both textual and map forms for policy action.

Land records are very important because they form the basis for assignment and settlement of land titles issues. The records kept at Tehsil office in India are of two types:

- Alphanumeric data containing record of rights details, crop statistics of individual plots, and
- The cadastral maps depicting the boundaries and extent of the plots.

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These are maintained in the form of village maps or Field Measurement Book (Thakur, Khadanga, Venkatesh, Shukla, & Meena, 2003).

On the other hand, UNFIG (1999) defined land registration as the process of recording rights in land either in the form of registration of deeds or the registration of title to land, and adjudication as the process whereby the ownership and rights in land are officially determined. Dale and McLaughlin (1999) averred that land registration provides the means for recognizing formalized property rights, and for regulating the character and transfer of these rights. Registries take note of certain interests in land including information about the nature and spatial extent of these interests and the names of the individuals to whom these interests relate. In Lesotho, the registration system focuses on the land with the unique identifier obtained from cadastral surveying (Selebalo, 2004).

Title registration systems is an authoritative record of the rights to clearly defined units of land as vested for the time being in some particular persons or bodies, and of the limitations, if any, to which these rights are subject and kept in a public office. With certain unavoidable exceptions, known in the English system as 'overriding interests', all the material particulars affecting the title to the land are fully revealed merely by a perusal of the register which is maintained and warranted by the State (Simpson, as cited by Selebalo, 2004).

To ensure that the land records under the title registration systems are authoritative and warranted by the State requires the lengthy processes of adjudication and surveying to cadastral standards, which are usually rigorous. The processes of land registration in many African countries can be quite time consuming; it still takes over six months to obtain a registered title (Steyn, 2003). It is therefore not surprising to find that there have been a number of initiatives to bypass the formal land registration system and to create land records that can be used for development projects.

In Nigeria, land instrument registration is the predominant land record. The Land Registration Act No. 36 of 1924 as variously amended is the major law regulating land registration in Nigeria, and it has been adopted and re-enacted in most states under different nomenclatures (Nuhu, 2009). The Land Instruments Registration Laws of the various states and the federation have been expressly ratified by S. 48 of the Land Use Act of 1978 to the extent of their conformity with the Act. Section 315(5)(d) of the 1999 Constitution provides for the sanctity of the Land Use Act. The Constitution thus gave the Land Use Act a strong footing. These laws prescribe for the establishment of a land registry in the respective state under a land registrar charged with the responsibilities of registering instruments affecting land in the state and keeping the registers, books and files in relation thereto safe.

Types of Land Registration Systems

There are three main types of land registration systems:

1. Private Conveyancing,
2. Registration of Deeds, and
3. Registration of Title.

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Private Conveyancing

In a private conveyancing system, land transactions are handled under private arrangement. Interests in land are transferred by the signing, sealing and delivery of documents between private individuals with no direct public notice, record, or supervision. The pertinent documents are held either by the individual to the transaction or by an intermediary such as a notary. In such a system, the state has little control over the registration process (save for regulating the intermediaries), and there is little if any security for errors or fraud. This system is known to be invariably slow and expensive (Dale & McLaughlin, 1999). Despite these serious limitations, notarial versions of private conveyancing are still in operation in some parts of Latin America.

Registration of Deeds

Under this system, a public repository is provided for registering documents associated with property transactions (deeds, mortgages, plans of survey and so forth). There are three basic elements in deeds registration: the logging of the time of entry of a property document, the indexing or referencing of the instrument, and the archiving (i.e., storing) of the document or a copy thereof.

Many versions of deed registration system exist today; however, they all center on three core principles (Nichols, 1993), which are:

- **Security:** Registration of a document in a public office provides some measure of security against loss, destruction, or fraud.
- **Evidence:** Registered documents can be used as evidence in support of a claim to a property interest (although they cannot provide an assurance of title).
- **Notice and priority:** Registration of a document gives public notice that a property transaction has occurred and, with exceptions, the time of registration provides a priority claim.

Deeds registration provides a means for registering title documents only; it does not register title to a property. Registration is often not compulsory and, as a general rule, many rights are not registered. Reviewing and assessing all the documents required to determine the validity of a claim to ownership can often be extremely tedious and expensive to undertake, and sometimes open to disputes (Dale & McLaughlin, 1999).

Registration of deeds is the predominant system of land registration in Nigeria today. Each state in Nigeria has its own Land Instruments Registration Law (Imhanobe, 2007).

Registration of Title

In this system, the register describes the current property ownership and the outstanding charges, obligations and liens. Here, registration is usually mandatory, and the state plays an active role in examining and warranting transactions. In most countries where this system obtains, the entry in the register becomes the proof of ownership. This is because in most cases, once a title is issued, it becomes irreversible. If someone with a better claim to the land

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resurfaces and establishes his claim, he does not recover 'his property' but rather has a remedy against the state in indemnity (Burdon, 1998).

There are various types of title registration system; the best known is that introduced by Sir Robert Torrens in Australia in the latter half of the nineteenth century. The Torrens registration system is based on three well known principles, namely:

a. **The mirror principle**: The register reflects accurately and completely the current state of title; hence, there is no need to look elsewhere for proof of title.

b. **The curtain principle**: The register is the only source of title information, which means a curtain is drawn blocking out all former transactions; there is no need to go beyond the current record to review historical documents.

c. **The insurance principle**: The state handles the veracity of the register and for providing compensation in the case of errors or omissions, thus providing financial security for the owners.

Title registration systems show a significant improvement over the rudimentary deeds registration systems. However, these title registration systems have been criticized for being often too expensive and cumbersome to implement and also for the length of time required for state examination and approval of the title and survey evidence. Some overriding interests that are not specifically registered gradually diminish the significance of the mirror principle. The details on the title certificate may not reflect all the rights as they exist on ground (Dale & McLaughlin, 1999).

The title registration system is unfortunately not popular in Nigeria (Olubodun & Onukwuli 2010). It was operated only in some parts of the old colony of Lagos, which include the present day Lagos Island, Victoria Island, Apapa, Ikoyi, Yaba, Surulere and some parts of Mushin (Imhanobe, 2007). Despite this, registration of titles is still valid under our laws.

Survey/Cadastral Records

The efficient and effective administration of land and its associated resources depends on the availability of sound land information. Many nations are computerizing their cadastral records and creating large, national databases. Land-related data are now being integrated, analysed, and distributed in ways that until recently were not possible (Zegeye, 2019).

Kurwakumire (2007) submitted that without functional and up-to-date land information, it is difficult to implement planning, development and exploitation of land resources sustainably for the betterment of the communities. Land is unarguably one of the most valuable resources of any nation and land information management forms a major part of urban development. Likewise, the increasing growth in rural population and the massive migration of people to the cities (especially in the developing countries) have put increasing pressure on rural and urban lands and facilities (Dale & McLaughlin 1988). Therefore, a systematic record and rational use of the land should be of prime importance to planners and policy makers.

Cadastre, as defined by the International Federation of Surveyors FIG. (1995), is a parcel based and up-to-date information system containing a record of interests in land (e.g., rights, restrictions, and responsibilities). It usually includes a geometric description of land parcels

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linked to other records describing the nature of interests and ownership or control of those interests. It may also include the value of the parcel and its improvements. More aptly, a cadastral system consists of collection, recording and storage of all information relating to individual land parcels. Cadastral surveying is that which establishes and records the location, boundaries and features thereon, and ownership of land and property. This is one of the data sources in the Geographic Information System (GIS).

According to Nwilo, Omotilewa and Alademomi (2010), GIS is a system for capturing, storing, manipulating, analyzing and presenting geographically referenced data. It is a multidisciplinary concept because it cuts across virtually every profession. They however stressed further that basically, a GIS consists of a set of tools that professionals in various disciplines use to improve the way they work. It allows many different types of data to be geographically viewed, organized and analyzed. This information can be used to computerize the Cadastral register.

Egbenta, Ndukwu and Adisa (2012) opined that GIS technology can potentially lead to the development of efficient and organized land markets, guarantee tenure security among land owners, increase revenue generation by government, reduce disputes among land owners, and as well foster prudent land management by establishing efficient system of land administration.

Computerized 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 (Siriba & Farah, 2014). GIS according to Nuhu (2009) is one of the modern methods that could be used in the computerization of land records as well as enhancing the process of land registration in Nigeria. This underscores the reason why many state governments in Nigeria are beginning to adopt GIS in their land administration processes. With the success story of the Abuja Geographic Information System (AGIS), other states such as Lagos, Niger, Bauchi, Benue, Cross River, and Nasarawa have also established their respective GISs.

Land Use/Physical Planning

Land use or physical planning can be described as a process aimed at achieving orderly physical development with the overall aim of evolving a functional and liveable environment where individual and common goals can be achieved. In urban centres, the essence of land use planning is to ensure that urban activities are organized and developed in physical space with due consideration for the protection of the public interest which include health, safety, convenience, efficiency, energy conservation, environmental quality, social equity, social choice and amenity (Adeagbo, 1998; Nnah et al., 2007).

It can also be described as the systematic assessment of land and water alternative patterns of land use and other physical, social and economic conditions in such a way as to encourage land users to select options that increase productivity and meet societal needs in a sustainable manner (Onibokun, 1985). This means that it is an art and science of organizing the use of land for the greater good of the society. Land use planning could therefore be expressed as physical planning. This is because physical planning attempts to achieve an optimal spatial coordination of different human activities for the enhancement of quality of life (Olajuyigbe & Rotowa, 2011).

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www.abjournals.org

Summarily, physical planning involves the reconciliation of land uses; provision of the right site for the right use; control of development; provision of facilities, services and public goods; preservation, protection and conservation of resources; and preservation of heritage sites, among others (Oduwaye, 2009).

The use of information communication technology (ICT) in physical planning is not new; it has been in fact contemporary with the development of computers themselves. The investment in research on urban models around the 1950s and 1960s was very intense and led to the development of some important models that were applied for the first time to real world case studies. An example is the Lowry Model (Lowry, 1964). These complex, aggregated models were aimed not only to research but also to help some highly capacitated public agencies to start understanding urban and regional areas as systems that could be controlled as machines. The period was described as the era of systems planning.

The 1980s brought to the limelight three instrumental features that were decisive for rebounding the interest of planners on new tools that from then on were beginning to be named as ICT:

i. Microcomputers which made the use of powerful computational and visualisation resources cheap and available to everyone,

ii. More capable database technology, which allowed the use of larger and better datasets, and

iii. The development of GIS as the first powerful tool to deal with data and cartography in an explicit visual manner.

The 1990s and the 2000s were the coming to age decades of the development of new ICT in planning. After a rapid diffusion of the use of GIS among all levels of planning agencies, professionals understood that they could take the next step towards exploring new tools and new approaches that would not only make use of GIS but also benefit from their popularity to interest the practitioners, a wide set of new tools and decision support systems based on many different concepts coming from different areas of knowledge—from physics to mathematics, from life sciences to economic theory. At the same time, computation became increasingly more visual, and brand new technology was used to create the first feasible virtual environments.

During these years, spatial and urban systems came to be regarded as complex ones; new disciplines were summoned, with researchers from all backgrounds becoming involved in the study of urban matters. This brought an entire new perspective to the field. Complexity became a central perspective in urban research, spanning from the more perceivable social, institutional and governance perspectives (closer to planning practitioners) to the mathematical and geographical perspectives (closer to researchers). The scenario gave birth to a wide set of ICT tools that are currently available for planning and policy design. They range from the use of advanced GIS, with new and more sophisticated methods of spatial analysis, to the enhanced capacity of providing valuable visualisation (both on 2D and on 3D), to the development of new modelling tools based on several approaches, from cellular automata (Pinto & Antunes, 2010) and agent-based simulation (Wise & Crooks, 2012), to discrete choice based models (Kakaraparthi & Kockelman, 2011), and to simulations based on optimization (Koomen et al., 2011). The development of 3D environments is also experiencing a significant increase based

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on the LIDAR technology (Yu et al., 2010) but mainly driven by the industry from which many platforms emerged, allowing the creation of highly realistic virtual environments (for example, the ESRI City Engine and the widely used Google Earth).

Additionally, the application of GIS in land use planning is well established (Fedra, 1995; Alshuwaikhat & Nassef, 1996; Brazier & Greenwood, 1998; Cromley & Hanink, 1999; Bojorquez-Tapia et al., 2001; Ball, 2002; Hoobler et al., 2003; Malczewski, 2004 and Trung et al., 2006). Notably however, Trung, Tri, Mensvoort, and Bregt (2006) applied GIS in three different land planning approaches:

- The participatory land use planning (PLUP) which strongly considers the local people perceptions and beliefs for land utilizations,
- The guidelines for land use planning by FAO enhanced with multi-criteria evaluation (FAO-MCE), and
- The land use planning and analysis system (LUPAS) using interactive multiple-goal linear programming.

GIS plays a crucial role in the application of these approaches. In PLUP for instance, GIS helps to integrate the acquired spatial entities and attribute data from farmer discussions and analyzes the changes not only in biophysical land cover but also in farmers' perception on land utilizations. In FAO-MCE, GIS is used to combine biophysical and socio-economic characteristics and to perform multi-criteria evaluation. In LUPAS, an optimization model was developed. The model is linked with a GIS for data input and results presentation. The land use planners can (as has been established) use the model to explore different land use scenarios with different objectives and constraints, both biophysically and socio-economically.

Empirical Review on Land Information Management Systems

In this review, we identified existing land information management systems that will at a glance display contributions made so far in this sector. However, since timely completion of activities involved are yet to be achieved with existing models especially in land registration; stakeholders still yearn for further improvement in the systems. It still takes weeks and months to secure approval from any government agency in Nigeria on land registration; an improvement on the system is imperative.

Ducker (1987) studied technical, economic and institutional issues surrounding the multipurpose land information system. His focus was on ways of modernizing land records through application of geographic information systems in land administration and possible problems the proposed system may face in implementation. The study noted institutional and economic constraints as major barriers in the implementation of the multipurpose land information system.

Enemark and Sevatdal (1999)—on their work titled Cadastres, Land Information Systems and Planning: Is decentralization a significant key to sustainable development?—evaluated the interrelationships of different land systems: land tenure system, land value system, land use control and land development system. They noted that the design of adequate systems in the areas of *land tenure* and *land value* would lead to the establishment of an efficient land market. On the other hand, the design of adequate systems in the areas of *land-use control* and *land*

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development would lead to an effective land-use administration. They averred that the combination of an efficient land market and an effective land-use administration would consequentially form the basis for a sustainable approach to economic, social and environmental development. The cadastral identifications of land parcels permeate through the land administration and land management systems and provide the basic infrastructure for running the interrelated systems within the areas of land tenure, land value and land use.

As a result of this development, the traditional surveying, mapping and land registration focus moved away from being primarily provider-driven to now being clearly user-driven. However, each of the systems (involved in the interrelated systems) includes tasks and processes that impose quite different demands on the cadastral system. The success of a cadastral system is a function of how well it achieves these broad social and economic objectives.

Fourie (1999) looked at developing cadastre and land information systems for decision makers in the developing world. The study emphasized that African countries should design land information management systems without a cadastral layer due to the cost implications associated with putting up such a structure. He therefore recommended a national spatial framework solely for visualization.

Due to challenges such as cadastral maps problems and the insufficiency of paper maps and land registers, Ibraheem (2012) proposed the development of computerized land and geographic information systems (LIS/GIS). The system is poised on digital cadastral maps and digital cadastral data bases (DCDB). The methodology involved several phases which include data collection and conversion, LIS structure and analysis, and the assessment of the accuracy of the digital maps. The results showed that the developed system can present the structure and information content of the digital maps as well as its differences with analogue maps. This digital cadastral map can be the basis for additional thematic layers, successively converting it into a complex system for management of administrative units. Ibraheem developed a large-scale land information system (LIS) by using geographic information systems (GIS) and field surveying. His work portrayed the problems of analogue cadastral maps, observing that the existing cadastre which consists of paper maps and land registers was highly insufficient. He recommended the creation of a land information system and a digital map.

Pindiga and Orisakwe (2013) developed a land information system of Tumpure residential and commercial layout in Akko Local Government Area of Gombe State. They created and tested a multimedia relational database of the attributes of the individual parcels and properties and linked them to the polygonized spatial positioning GIS software. On the other hand, video clips of properties within the studied neighborhood were obtained and linked to GIS software and the system developed afterwards was found to be efficient. The study recommended the use of Arc 3.2 GIS software in land administration.

Chiemelu and Onwumere (2013) noted that the manual land administration system has been in use by the Ministry of Lands and Survey, Port Harcourt since its inception and it has not meaningfully assisted the government in physical planning and revenue generation. Manual land registration from their findings is prone to abuses, time consuming and inefficient. The study discovered that since the implementation of integrated land information management in Rivers State, the government's internal revenue in the land sector improved and delays associated with land administration greatly reduced.

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Abbas, Ben-Yayork and Muhammad (2014) developed a Land Information System (LIS) for providing a better and more efficient system for land management in Tsaunin Kura Residential Layout in Chikun Local Government Area of Kaduna State, Nigeria in response to the absence of an electronic way of land administration. The system developed can maintain and track changes, detect errors and make online corrections.

Kurwakumire (2014) made conceptual contributions to digital cadastres facilitating land information management. According to his work, modernization of cadastral systems in municipalities through technological reforms to improve access to cadastral information, as well as modernization of deed generating processes, can greatly reduce time required for land transactions.

Delays in land registration encouraged Wanjohi and Mutua (2015) to develop a Web Based Integrated Land Information System (WBILIS) for ownership, value and taxation using the Ministry of Lands, Housing and Urban Development, Kenya to demonstrate the application of the system. The system aimed at providing an effective land information collection, storage and dissemination platform for the Ministry of Lands, Housing and Urban Development. The WBILIS contained information on parcel ownership, land use, taxation, location boundaries, land value, encumbrances and many more. It demonstrated a streamlined flow of land information within the Ministry ensuring there was a well structured process of collecting, storing and disseminating land information.

Deane, Owen, and Quaye (2017) summarized all the required activities on "The Ghana enterprise land information system (GELIS) as a component of national geospatial policy" that can enable Ghana to develop a comprehensive land administration system that will ultimately lead to a national spatial data infrastructure. The policy implementation plan was not an academic exercise; it was rather a practical and operational solution to well known and acknowledged sets of problems designed to ensure greater effectiveness and efficiency across many units within the land sectors. The study carried out an extensive review of the current GELIS (under land administration project 1) noting all the inherent problems and current public needs; on the basis, an integrated comprehensive Ghana land information management system was developed (under land administration project 2). Critical stakeholders and their individual roles were identified; the linkage of all units and demonstration of the systems functionality was vividly elucidated.

Emengini, Akpata and Ejikeme (2017) developed a Cadastral Information System (CIS) which can be used to organize land records, holdings and descriptions of both spatial and non-spatial entities of parcels and land information. The (CIS) has the capabilities that allow recording, storage, update and retrieval at any time of all land related information.

3D Land Administration: A Review and a Future Vision in the Context of the Spatial Development Lifecycle by Kalogianni, Oosterom, Dimopoulou and Lemmen (2020) looked at the possibility of improving 2D based systems used to define legal and other spatial boundaries relating to land interests. The study noted that the built environment is increasingly becoming spatially complex; land administrators are presently challenged by the unprecedented demand to utilize the space above and below the earth's surface and the relationship between people and land in vertical space can no longer be unambiguously represented in 2D. They further submitted that in order to integrate different standalone systems for optimal service delivery, 3D data collaboration, sharing and reuse across sectors and disciplines in the life cycle is very

Article DOI: 10.52589/AJESD-RI2X0ZQ2
DOI URL: https://doi.org/10.52589/AJESD-RI2X0ZQ2

crucial to enable new ways of data harmonization and use in any complex environment. Web-based system architecture was proposed in the study for a future 3D Land Administration System.

From the above studies, it is evident that land information management systems (LIMS) still function at different units especially where they are obtainable and no holistic and nationalistic view has been taken, especially in Nigeria. Most LIMS in place did not specify the actual information system adopted for its design but noted the importance of such systems in the land market.

More so, the human computer interaction perspectives of automation were not considered. This can be traced to the fact that most of the authors are not software specialists and/or land management experts. This review exposed the fact that specific activities that constitute the mandate of the Ministry of Lands have not been holistically covered in LIMS developed in Nigeria. The existing automations are only within specific units of the ministry and this explains the delay still experienced in completing documentations in the Ministry. Inter departments' or units' relationships in the Ministry have not been integrated in the systems; hence, undue time is wasted to link departments or units especially when there is a need for their professional opinions on the subject applications.

This review reveals that available land information management systems are yet to solve the problem of delay in land title registration process; obtaining real time information for effective physical planning and reliable decision making is not only important in Nigeria but also across the globe. Indeed there is a need to fill this existing gap through the development of a robust system that can integrate and run the activities for the Ministry. Such a system must be web based for global accessibility and use.

CONCLUSION AND RECOMMENDATIONS

Land management information system is a critical component of nation building. It is positioned to assist policy makers in making decisions that are evidenced based for effective physical planning and policy making. On the other hand, it also enables citizen's access land title information with ease. This review revealed that Nigeria is still far behind in this regard; some states of the federation have introduced a working automated land information management system in their relevant ministry, but delays in processing land title applications are predominant. Aside from delays in getting consents from the chief executive officer of the state or the designee, completing the documentation is still an issue that should be addressed with a functional system in place.

Additionally, land title registration procedure is still shrouded in secrecy in Nigeria and many citizens still lose their allotted plots due to the poor documentation system. Based on these findings, the study recommends the following:

i. Streamlining land management activities of the Ministry of Lands to serve as a benchmark for operations of the ministry in Nigeria.

ii. Integrating the activities of all the departments or units in the Ministry of Lands in their interrelatedness for easy automation as a process.

Article DOI: 10.52589/AJESD-RI2X0ZQ2
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iii. Developing national land information management system which integrates the states' land management systems as answer to the quest for national land database.

iv. Training of all relevant officers on modern ICT skills to increase their dexterity in the prosecution of automated land management systems.

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