A WEB-BASED PLATFORM FOR IMPROVING LAND MANAGEMENT SYSTEM

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Abstract: **Most of the challenges associated with land and housing management especially in the developing countries are majorly attributed to various methods of managements. These challenges have resulted to poor record keeping and accountability, ownership conflicts, and economic losses. With the advancement in information system technologies such as web-based systems, satellite remote sensing, and mapping technologies, a modern management platform known as web-based management platform can be developed and employed to address land management challenges which have brought severe socio-economic problems. This web-based management system shall be built with the help some information and web technological tools; programming language, application server and web server. This management system shall ensure proper handling of land data/information and other major services associated with land. Hence, the implementation of this web-based platform will bring about great improvement in the field of land administration and management.**

Keywords: **Web-based System, Land Management, Data Capturing Technology, Web-Based Technologies.**

I. INTRODUCTION

Web-based Support Systems (WSS) is viewed as a multidisciplinary research area that focuses on supporting human activities in specific domains or fields based on computer science, information technology, and Web technology. Research on WSS is motivated by the challenges and opportunities of the Internet and the Web. The recent advancements of computer and Web technologies make the implementation of WSS feasible [1]. WBS was originated from the knowledge of ISs, software engineering, Internet application, and technological advancements in order to migrate from stand-alone IS to Web enabled systems [2]. Hence, this technology can be deployed in the field of land management in order to mitigate most of its present challenges resulting from the current poor or inefficient management technology.

Land is a resource that is fixed in supply but its demand for various uses is variable and on the increase as human population keeps on increasing. The fundamental need for adequate land administration systems in all countries of the world is to provide reliable platform for sustainable development; this forms the bottom line for: economic, social and environmental development, as well as good governance [3]. Land and its numerous resources are very important for all human activities. The quest to possess and take charge of various parcels or plots of land and resources contained therein has become competitive amongst persons, families, villages, communities or regions which have led to numerous land conflicts especially in the urban regions. Hence, an improved system for managing land and its resources has become an emergency need especially in developing countries such as Nigeria [4].

Land as a special and fixed natural resource provides enormous flexibility of purposes. Some of the applications of lands are as follows; animal husbandry, residential, erosion control, commercial activities, agricultural, institutional, transportation and recreational purposes. The cadastral information system that contains all the necessary details of any parcel or plot of land is the most important component of land management. In most of all the land management agencies, especially in the developing countries, the paper work methodology remains the critical part of their management platforms. Land registration, data collection and documentation, data storage, and several other activities are being handled through paper work and

some level of information communication technology (ICT).

Most land management agencies in Nigerian States such as Akwa Ibom still make use of poor management system. This inadequacy in the part of methods being used have guaranteed the possibility of scattering and duplication of information amongst different units/departments of agencies, and poor land monitoring system, thereby hindering the developmental processes within the affected region or state. The technological efficiency of land management cannot be over emphasized as they provide excellent platforms that will meet the needs of both the government and the clients in the area of land administration and management. This paper examined the challenges and limitations of different platforms for land administration and management, and also proposes a more reliable and faster land management platform that allows and maintains public interactive participation through an online web-based platform which is necessary for maintaining better public trust in land management.

Poor land-use management and monitoring techniques have the followings as their major challenges:

(i) Poor interactive platform between the land agencies and the clients
(ii) Poor record-keeping and accessibility,
(iii) Land conflicts resulting from ownership and boundary demarcations,
(iv) Scattered illegal buildings or structures,
(v) Fraudulent activities, and
(vi) Undue delay of land and building registration activities.

Land management has been handled through different means ranging from traditional methods to paper or hard-copy techniques and to the current hybrid techniques which combine both paper works and some level of ICT. Although, land management has been implemented through these means but there are still some serious challenges hindering the efficiency of these techniques, and these challenges can be addressed through the application of a high level web-based technology. In the recent time, the advancement in web-based systems and data capturing technologies such as satellite remote sensing technology and free web based mapping technologies and services have resulted to a reliable and profitable data management platform known as Spatial Information System (SIS). SIS is designed specifically to address the collection, manipulation and visualization of data that are geographically referenced, that is, data that are linked to a location in space. With these technologies, a well fit-to-purpose web-based system can be designed and programmed for efficient land management. The main objective of this paper is to carry out a critical review of an automated web-based system for efficient land management, and propose a more reliable, accurate and faster land management platform that allows and maintains public interactive/participation through an online web-based

platform. Hence, this paper proposes a fit-to-purpose web-based technology for efficient land management.

II. REVIEW OF RELATED LITERATURE

With the advent of web based technologies, and the proliferation of the internet as logical platform for businesses to interact with their customers, came the eGovernmence wave. Governments around the world embraced the internet and most have adopted eGovernmence strategies and programmes. As a result of this, the obsolete paper based cadastral system was made to become an e-Cadastre system. An example of this is South Africa's Project Vulindlela, which is the development and implementation of an e-Cadastre. Another trend in the technology is the concept of "Open-Source" technology. Open-Source is usually described as computer programming platform from which different source codes are made available and free (as against proprietary) to the general public for references or modifications [5].

Traditional approaches to land administration result in design and implementation project that take a long time. However, the introduction of innovative technology such as geographical information system (GIS) has been playing a leading role. The processes involved in land registration are cadastre formulation, land valuation and land inventory. Different countries or regions of the world tend to achieve these processes through one method or the other. Whatever the stage of development is, modern technology plays a role in executing these tasks [6]. According to [7], the four land administration functions (land tenure, land value, land use, and land development) are different in their professional focus, and are normally undertaken by a number of land practitioners such as land-valuers, land-economists, developers, planners, surveyors, engineers, and lawyers.

Land management system (LMS) was created first in Europe to maintain land ownership and ensure security of tenure, and also provide platform for adequate taxation [8]. Many lands and housing management agencies or departments in developing countries are encountering some major challenges with respect to their management systems and services [9];[10]. According to [11], recent technologies and scientific findings and developments should be judiciously utilized at all times for improving land management and administration. A properly designed cadastral system provides land right assurance within the geographical area of interest as desired by every land owner. The cadastral systems that comprises of all the basic land policies are usually implemented to govern the fundamental land issues, and also ensure that strong institutions meant for adequate land are being established. These cadastral systems have been found to be country or regional based [12].

The implementation of an adequate land administration, ushers in better managed cities, effectively managed

infrastructure and utilities, secured land rights for all including women and indigenous people, minimum land rights conflicts, and higher economic stability and growth. One cannot therefore overemphasize the need (and role of) fit-for-purpose, affordable and inclusive land administration systems anchored in enabling technologies [5]. The time to argue whether we need to deploy technology in Land Administration System (LAS) is already long gone. The debate nowadays is no longer whether we need technology, but what kind of technology and how we should deploy technology to modernise land administration. A modernised LIS can be argued to be the bedrock of any economy, whether it is an industrialised economy, an agrarian economy, or even a services-based economy [5]. Being an integral component of the overall Land administration process, computerisation of land records is therefore the first step towards making digital cadastre possible as far as land record management is concerned [12]. Some of the challenges associated with WBSs are data security relating to data integrity and confidentiality, virus attacks, and other user related issues such as loss or forgotten username or password, and slow access to platform due to poor Internet connection [13].

III. MATERIALS AND METHOD

With respect to this paper work, a number of online journals relating to web based system and land information management system (LIMS) were downloaded and studied for efficient knowledge gathering. Some of these journals that presented good insights with regard to this work were cited in this paper.

Meanwhile, a trip to the Ministry of Land and Town Planning presented the opportunity of discussing LIMS challenges and also enabled the collection of some relevant data that supported this paper work. Hence, a sample of digital survey plan that shows all the coordinates and identification numbers of a specific area of land in Akwa Ibom State is as shown in Figure 1.

Figure 1: A sample of digital survey plan

IV. SYSTEM DESIGN AND IMPLEMENTATION

The web-based system will adopt waterfall model for its design that will make use of a Participatory Evolutionary Software Development Methodology (PESDM). The efficiency of PESDM is its ability to allow different modules within the system to be implemented in parts. The phases involved in developing this web-based land management system include the following; planning, creation of modules, software requirement, designing, testing, implementation, documentation and deployment. The proposed system will be divided into three modules; the Client's module, the Administrator's module and the Land Registration module. The Client module contains few activities as shown in Figure 2, while the Administrator's module that contains majority of the system activities is shown in Figure 3, and the Land Information module that contains land description details is as shown in Figure 4.
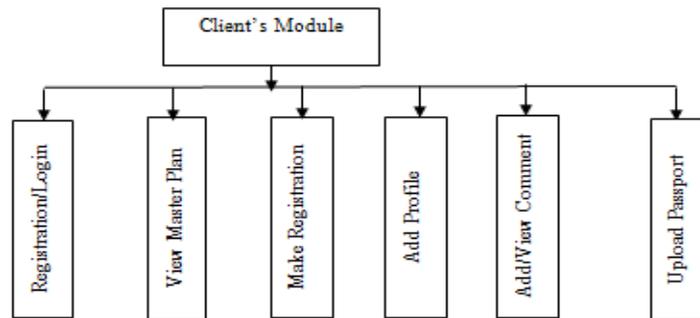
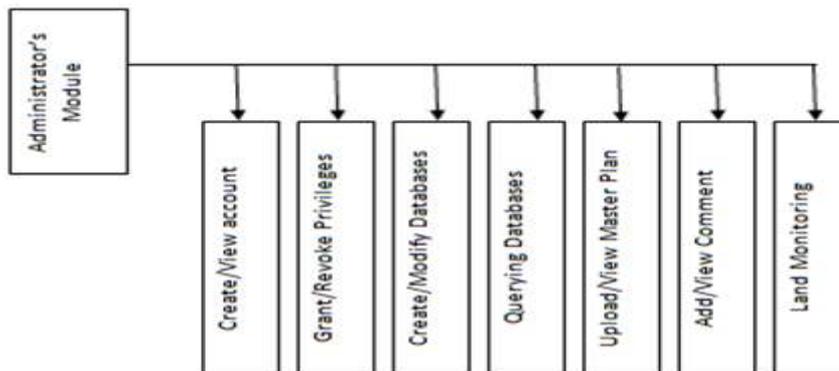Figure 2: The Client's activities module

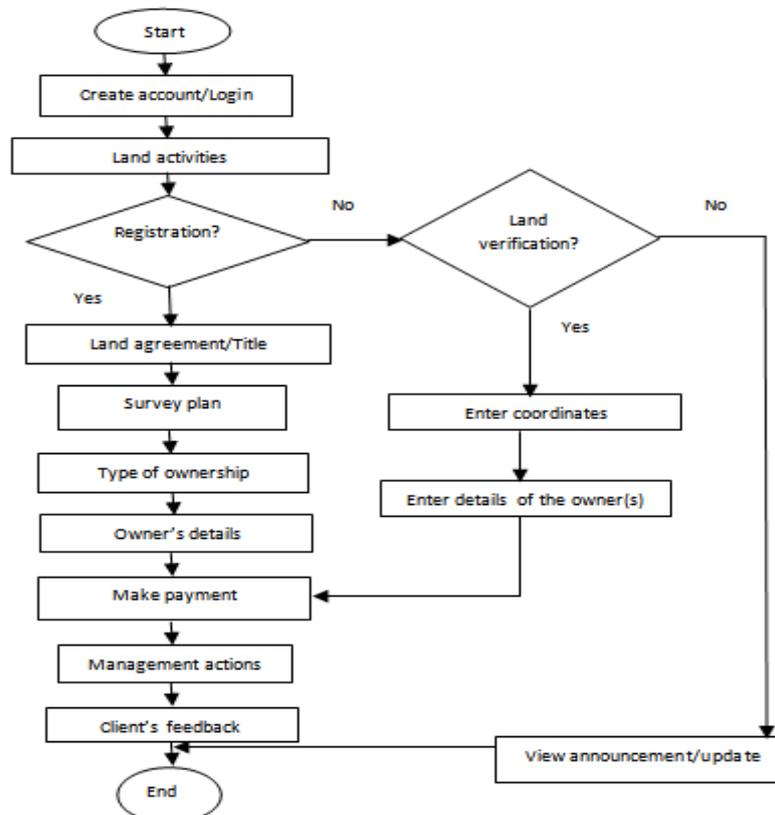Figure 3: The administrator's activities module

Figure 4: Land transaction Model

To actualize the proposed system, the following technologies will be used; MySQL for database creation and management, HTML and PHP for web interfacing, Windows operating system, Google map API (Application Programming Interface) for the maps, Google Earth for real-time visualization and monitoring, and Apache as web server. WAMP (Windows, Apache, MySQL and PHP) server helps to integrate these programs together into one package. There are different databases to be created to handle various modules of the system, and thereafter be integrated into achieving the set goals of the management system. The system will require detailed mapping, up-to-date geospatial information, and land owner's details. To make use of this web-based system, an internet and internet accessible devices such as conventional computers and mobile phones are needed.

V.   RESULTS AND DISCUSSIONS

This web-based system provides the users with an internet management platform that shall be capable of displaying the coordinates of any selected parcel or plot of land along with the owner's details, and will also make visualization and monitoring possible for the administrator(s). With this system, different land management challenges including conflicts, multiple sales of land, poor organization and storage of land related data, unnecessary delays, internal fraudulent activities, and poor land monitoring technique will certainly be addressed as it ensures real-time monitoring and efficient information about any parcel or plot of land within the coverage areas. Although, only the administrator have the privileges to real-time land monitoring and accessing every data or information within the automated platform, but other users have some privileges granted to them by the system administrator. Hence, this automated system allows seamless verifications and data or information sharing.

VI.   CONCLUSION

Considering the enormous land related conflicts and other predicaments associated with land management, it is therefore necessary to maintain an appropriate up-to-date spatial and non-spatial management system in order to address most of these land management challenges. With WBS as a means of automating management activities and transactions, every government or constituted authority that needs to maintain effective land management for peaceful coexistence and sustainable development should integrate automated land management. However, a well-designed fit-to-purpose web-based land management system should be implemented in different States or regions as land management varies with different peoples and cultures. The automated system affords users the opportunity to carry-out land management transactions from any location with strong Internet connection. Hence, this system will make land management fast, easy and accurate.

VII.   REFERENCES

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