DYNAMIC WEB FOR LAND REGISTRATION TOWARDS THE ADOPTION OF LAND ADMINISTRATION DOMAIN MODEL IN NIGERIA

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To the Glory of God,

and

Adejoke my late wife, my children, Oluwamuyiwa, Boluwatife and Inioluwa

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ABSTRACT

Land administration system includes the processes of land registration, cadastral mapping, land valuation and land inventory. Developing countries particularly Nigeria, is faced with challenges of poor land administration and management. Traditional approaches to the land administration have resulted in the delay of the processes of land titling and registration. However, it was discovered from previous works and available literatures that there is no model, blue print or database management system of activities in land administration in the study area. The delay in time and process of getting the certificate of occupancy (C of O) coupled with the corruption in land related activities calls for urgent intervention of all the stakeholders in land administration. In this study, Land Administration Domain Model (LADM) which was approved by International Standard Organization (ISO) TC/211 in 2012 was introduced as a reference model and standard for land administration. Validation and comparing of the physical content of land administration system in the study area were made against LADM to verify the possibilities of its adoption into the system. An online network of the processes involved in land registration was also done. A dynamic web was designed using PhP My Admin SQL to create dynamic database management system. A user-friendly and more secured database management system was produced for the specification of LADM on the software platform that offers support for the transformation. Based on these findings, it was concluded that Nigerian land administration system can adopt the standard by mapping in some of the core concepts of LADM into her cadastral system because the model is suitable for the country. However, the determination of the country profile for Nigeria is next in priority.

ABSTRAK

Sistem pentadbiran tanah termasuk proses pendaftaran tanah, pemetaan kadaster penilaian tanah dan inventori tanah. Negara-negara membangun, Nigeria, menghadapi cabaran dalam sistem pentadbiran dan pengurusan tanah yang lemah. Pendekatan tradisional terhadap pentadbiran tanah pada masa lalu telah mengakibatkan penangguhan proses penamaan hak milik tanah dan pendaftaran. Walau bagaimanapun, berdasarkan kajian lepas dan literatur sedia ada menunjukkan bahawa tiada model, pelan tindakan atau sistem pengurusan pangkalan data dalam aktiviti pentadbiran tanah di kawasan kajian. Kelewatan masa dan proses untuk mendapatkan Sijil Kependudukan (SP) serta kegiatan rasuah dalam aktiviti berkaitan tanah memerlukan campur tangan segera daripada semua pihak yang berkepentingan dalam pentadbiran tanah. Dalam kajian ini, Model Domain Pentadbiran Tanah (*LADM*) yang telah diluluskan oleh Organisasi Piawaian Antarabangsa (*ISO*) *TC* / 211 pada tahun 2012 diperkenalkan sebagai model rujukan dan piawaian untuk sistem pentadbiran tanah. Pengesahan dan perbandingan kandungan fizikal sistem pentadbiran tanah di kawasan kajian dibuat dengan *LADM* untuk mengesahkan kemungkinan penerapannya ke dalam sistem. Proes rangkaian dalam talian yang sedia ada, setelah diminta untuk memenuhi keperluan pengguna dalam soal selidik yang ditadbir antara para pemegang amanah. Proses rangkaian dalam talian yang terlibat dalam pendaftaran tanah telah dilakukan. Web dinamik telah direka menggunakan *PhP My Admin SQL* untuk membuat sistem pengurusan pangkalan data dinamik. Sistem pengurusan pangkalan data yang mudah digunakan dan lebih selamat telah dihasilkan dengan spesifikasi *LADM* pada pelantaran perisian yang menawarkan sokongan untuk transformasi. Berdasarkan dapatan ini, dapat disimpulkan bahawa sistem pentadbiran tanah di Nigeria boleh mengguna pakai piawaian tersebut dengan memetakan beberapa konsep teras *LADM* ke dalam sistem kadasternya kerana model ini sesuai untuk negara itu. Walau bagaimanapun, penentuan profil negara merupakan agenda utama.

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LIST OF ACRONYMS

FIG   -   International Federation of Surveyor

LADM   -   Land Administration Domain Model

CCDM   -   Core Cadastral Domain Model

ISO   -   International Standard Organization

TC   -   Technical Committee

GIS   -   Geographic Information System

LIS   -   Land Information System

CIS   -   Cadastral Information System

DBMS   -   Database Management System

GPS   -   Global Positioning System

GNSS   -   Global Navigation Satellite System

3D   -   Three Dimensional

4D   -   Four Dimensional

DDL   -   Data Definition Language

DML   -   Data Manipulation Language

LAS   -   Land Administration System

SDI   -   Spatial Data Infrastructure

RRR   -   Rights Restrictions and Responsibilities

ATS   -   Abstracts Test Suites

CLIS   -   Cyprus Land Information System

2D	-	Two Dimension
ICT	-	Information and Communication Technology
PTC	-	Presidential Technical Committee
FELIS	-	Federal Land Information System
C of O	-	Certificate of Occupancy
LIM	-	Land Information Management
UN	-	United Nations
FCDA	-	Federal Capital Development Authority
SURCON	-	Survey Registration Council of Nigeria
DGPS	-	Differential Global Positioning System
GLTN	-	Global Land Tools Network
UNH	-	United Nation Habitat
STDM	-	Social Tenure Domain Model
SOLA	-	Solution for Open Land Administration
OSS	-	Open Source Software
PHP	-	Hypertext Processor
HTML	-	Hypertext Markup Language
CSS	-	Cascading Stylesheet
DDP	-	Data Development Programmed
UML	-	Universal Modeling Language
MDA	-	Model Driven Architect
CASE	-	Computer Aided Software Engineering
JDBC	-	Java Database Connection
VP	-	Visual Paradigm
ERS	-	Entity Relational Schema

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CHAPTER 1

INTRODUCTION

1.1   Background of Study

Land is the foundation of the most significant asset on the earth, without which, a man would never exist as it is proceeded with presence and his developments. The land is forever settled natural endowment of nature. The necessities and its requests continue to expand each day because of the increase in demands. The space to develop, the space to fabricate and to live is getting to be noticeably difficult to reach. The government needs to get the land for provincial and urban developments, the community and the private land is expected to manufacture private houses. Land use and the enthusiasm for the land wound up plainly confused because of urban and country development. The administration of land is a traverse sectional and multidisciplinary zones of legal technical, managerial, political, and institutional economic extension. An adequate response in typing of limit advance measures must demonstrate this fundamental quality (Enemark *et al.,* 2015). This framework is by all accounts the main arrangement man can use to comprehend the country and urban areas convoluted issues. In Enemark *et al.* (2015) land administration is the way towards controlling land, the use of property development and preservation of land. It likewise includes the gathering of incomes from the property tax collection, the settling of the questions on the possession, offers of land and use of land. However, the fundamental point and targets are to make an open and secure market economy with the goal that land is changed into economic values.

In cadastral studies, there have been a few endeavors towards characterizing land administration. The United Nations Economic Commission for Europe has additionally characterized Land Administration as the procedures of deciding, recording and dispersing information about proprietorship in regards to Rights, Restrictions and Responsibilities (RRR), esteem and the use of land while executing land management strategies (FIG, 1999). These definitions are limited and restricted to the possibly wide cluster of capacities and organizations that contain land administration. In a more extensive sense, land administration is what mirrors the significance of establishments, conventional expert structures and different angles, for example, governmental issues.

Land administration system has encountered series of birth and resurrection throughout the years in numerous undeveloped, developing and developed nations. Nigeria as a developing country likewise attracted up their land administration and management system. It is intended to help the rights of individuals, formal and informal, rural and urban society about land. All related information on land matters is made accessible anytime to all including individuals in land business. Getting this information guarantees the well-being of the exchange and the likelihood to distinguish the exchange (Siejka *et al.* 2014). In perspective of this, the International Federation of Surveyor (FIG) which is an International organisation representing the interests of surveyors around the world, in 1994 commanded the Cadastral and Land Management Working Group Commission 7 on the current cadastral and the vision, to deal with the future Cadastre framework, (FIG, 1999; Jürg and Steudler, 1998).

Given this, the procedure and development in Cadastre 2014 brought forth Land Administration Domain Model (LADM) and Core Cadastral Domain Model (CCDM) (Van Oosterom *et al.* 2006), (Dinao and Coetzee 2013). LADM was authoritatively published on December 1st, 2012 by ISO19152. (Van Oosterom *et al.* 2013). LADM was affirmed by the International Standard Organization of ISO 19152 specialized committee TC/211 for Geographic Information/Geomatics. LADM was composed as a standard for all land administration, register and exchanges inside the localities and nations. LADM is a unique conceptual reference model that empowers the included party or parties to cooperate on a similar stage in light of mutual

terminologies, land administration domain model that backs up the application and development of the product and data quality investigation and management in land administration system (Van Oosterom *et al.* 2012). LADM is an extendable, compelling and productive space master in any nation to create LADM packages based on LADM for their countries.

Tragically, Land Owners, Potential Owners, Agents, Lawyers, Town Planners, Land Surveyors and Real Estate Managers and all other parties need to move from workplaces and distinctive segments of the Land Bureau, Land Registry Land Survey Area Offices, the Surveyor Generals` Office, the Revenue Offices, other Departments and courts to process for Certificate of Occupancy and other related archives for land registration takes so much time and vitality. In a similar vein, there are a few other areas of the society that likewise need other information. For example, mortgage institutions, insurance organizations, banks, and Tax Offices are typically disappointed and demoralized because of non-accessibility of the information they asked for, is lost, or mysteriously absent since there is no record for it. Likewise, there is no blue print or model for land administration in the study area. This has made it hard to have a standard and set down procedures in all cadastral exercises.

1.1.1   Justification for the study

The justification for this study came as a result of the fact that there is no blue print or model, static and dynamic database management system (DBMS) in the study area. Thontteh and Omirin (2015) and Akingbade (2005), acknowledged some of the key features of the current land administration system by working out an Electronic for Web Document Management System (EWDMS) for land administration framework. While Atilola (2013) agreed that the three major problems of high cost in land titling, insufficiencies of skilled staff and unbalanced institutional systems were not solved. Neither do the method aided reduction in land disputes and increase in the number of application request handled per day. He frayed that the method involved

must be more than the use of computer hardwares and softwares to build up a database since the method practically failed to develop an effective and easy to use dynamic web which would have solved the problems of land disputes, institutional framework problems and the increase in the number of applications handled so as to remove the fraudulent practice in land administration system in the study area. In order to enhance and change this revolting circumstances, there is a need to build up a dynamic web connected with the system of the procedures in land registration and proposes a conceptualization of land titling on LADM through a dynamic database because individual relationship to land has an exceptionally dynamic nature. The significant of web development in this study is that, the dynamic DBMS created stores all the information as identified with on the land, ownership and the Certificate of Occupancy, (C of O), (the written work declaration that demonstrated the responsibility for property) to take care of the issue of cabinet filling. Be that as it may, whatever the phase of the development of any country, technology assumes exceptionally crucial parts in obtaining a sound innovative development in land administration. Conventional ways to deal with land administration in the past has brought about the deferral of the procedures of land titling and registration. The creative technologies brought by Geographic Information System (GIS), Land Information System (LIS) and Cadastral Information System (CIS) have been playing a main part in the development of cadastral and land administration in Nigeria.

Having discovered the existing problems, this study endeavors to close the security of tenure gap found in the study area where up to 85% of the land and the populace are outside the formal land administration system (World Bank, 2010). The investigation likewise significant to other developing countries without finished land registration, cadastral scope and where the upkeep of land information have fizzled. It is perceived that by giving the spatial and institutional structures for this reason, the system likewise gives the premise to building land valuation and tax collection systems and in addition a framework for land use planning and control. Despite the fact that the study is not a manual sort, but it rather gives a managing belief system to building viable and effective land administration frameworks. Nonetheless, this ideological rule ought not to be a misguided judgment for authoritarian, but rather ought to be viewed as planning and direction for planning a country particular methodology for execution.

It is trusted that this study will be useful in the route forward in the usage of reasonable and moderate land registration in developing countries that will empower security of tenure for all and viable management of land use and natural assets, encouraging social values, economic development and ecological maintain-abilities which give three fundamental parts as follows. In building up a model for land administration system, users' requirement evaluations were carried out among the professionals representing all the involved parties in land business as shown in Figure 1.1.

To understanding the approach and the system workability used in the study, a guiding manual is attached (Appendix A).

In implementing the approach, recommendations were provided in more detail on how to build sustainable Information and Communication Technology (ICT) solutions and on lessons learnt from other countries that have started adopting the LADM standard.
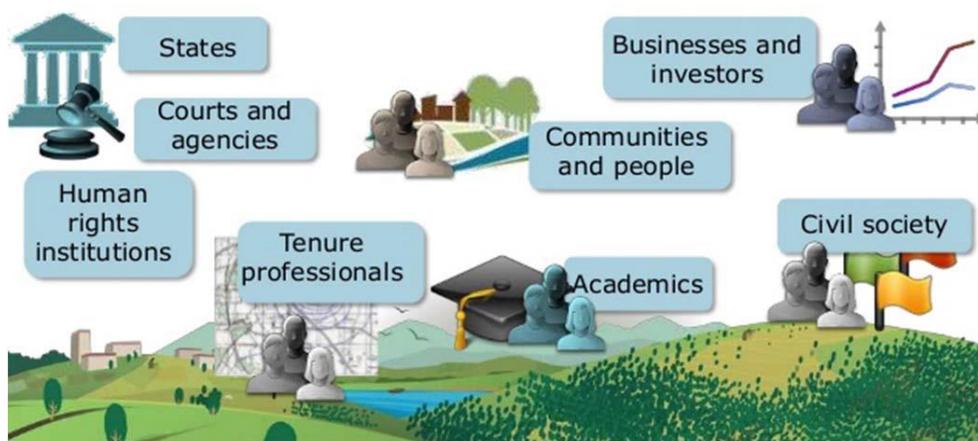
Figure 1.1: Involvement of all Party Modified (Enemark *et al.*, 2015)

1.1.2 Study area

Nigeria occupies an area of 923,768 km² on the coast of West Africa. The land use pattern shows the arable land is about 33 % of the total land area. The pastures land covering 44%, permanent crops covering 3%, forest 12 % and others 8 %; thus, the land is still the primary asset of rural Nigerians with over 80 % being peasant farmers.

Table 1.1:   Land usage category in Nigeria

S/No	Category	Area (sqkm)	Percentage of Total Land %
1	Arable land	304,843.44	33
2	Pastures land	406,457.92	44
3	Permanent crops	27,713.04	3
4	Forest	110,852.16	12
5	Others	73,901.44	8
	Total	923,768	100

Figure 1.2: Map of Africa (Njepuome, 2011)

Nigeria is located on the longitude 2º-15ºE and latitude 4º-14ºN (Njepuome, 2011) with 36 state and a federal capital territory which is the seat of the Federal Government. There are 250 ethnic groups speaking over 400 different languages from 774 local governments with over 170 million people. Nigeria is divided into six geo-political zones used for developmental, planning and political appointment. The land administration and cadastral systems in the same geopolitical zones are similar because of their geopolitical affiliation and integration (Figure 1.3).
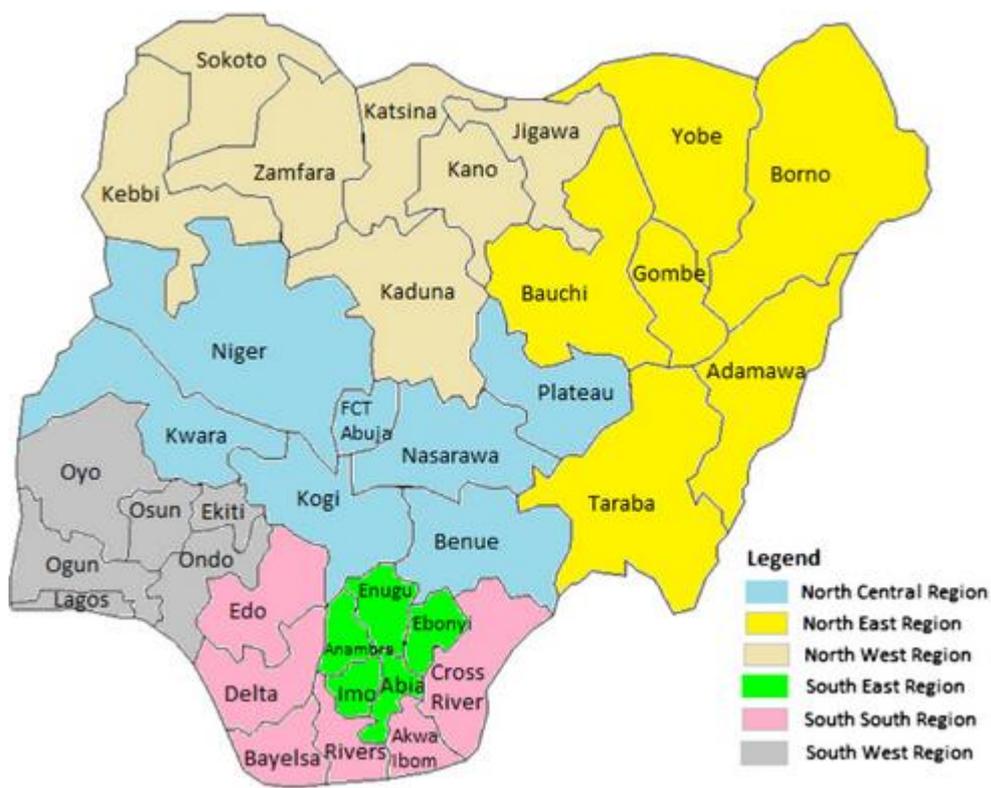
Figure 1.3: Map of Nigeria (Njepuome, 2011)

1.2   Problem Statements

Title registration is a conceptual term used to allude documents, records and acts that demonstrate ownership (Nuhu, 2011). It makes the nature appropriate in land being passed-on from dealer to purchaser. Title documents might be a declaration of inhabitance or a registered conveyance. Security of title to land is exceptionally crucial as it is frequently amazingly troublesome if unrealistic to acquire speculation supports and funding without it. (Enemark *et al*. 2015), pointed out that poor land title registration and administration is an obstacle to the development of an economy of any country. They additionally identified the benefits of good land registration, administration and management. Land registration permits conceivable brisk and beyond any doubted techniques for making and securing contracts. Every single present day constitution acknowledge and cultivate private rights and ownership of

land. Be that as it may, the advantages have been a hallucination on account of most ownership in the study area.

1.2.1 Land Use Act

The issue of land title registration exuded from the act of a few provision of Land Use Act of 1978, which is the law controlling the administration of land in Nigeria (Land Used Act, 1978). Application for consent has dependably been liable to the managerial organization that prompts a period delay in concluding the processing because of the web of development of documents starting with one office table, then onto the next.

1.2.2 Financial Abuses

The procedures likewise prompt money related abuses influencing the handling costs to escalate. The method of getting a C of O is costly and tedious notwithstanding endeavors to limit the season of creation. The land surveyor is to acquire data and keep up the datasets. Atilola (2013) agreed with (Oboli and Akpoyoware 2010) that land surveyors likewise in charge of the generation of the overview plan required to be joint to the lawful instrument for the registration of titles are additionally not legitimately secured enough.

1.2.3 Bureaucratic system

The bureaucratic system included in assent handling makes it difficult to be finished up until around five years from the date of application. In Eleh (2009), it costs

around 1.5 % of property estimation as title registration charges and not as much as a day to conclude land registration in Canada, while in Ghana it is around 2 % of the evaluated esteem and takes around three months. World Bank is of the opinion that it ought not to take more than 13 phases and around 82 days to get title registered in Nigeria rather than 35 phases and 5 years. The World Bank analyzes and conclusion sets Nigeria as the slimmest great country to execute property business in the sub-Sahara Africa (Nuhu, 2011).

1.2.4   Analogues and records keeping system

The techniques and procedures for cadastre in Nigeria have been by keeping data in cards and records. The data are put away in the cupboards at the land registry and exceptionally restricted to availability. The document paper strategy for keeping records is prevalently known as the ordinary simple technique. This technique is defenseless to botches, the trouble in following a record, the issue of getting data in a bureau is repetitive as it is ineffectual and wasteful because it energizes misrepresentation, gradualness of work, oversights and disparities in contrast with current strategies. The subsequent audit for land registration system in the study area is that, there is no blue print or model as to do the procedures and there is no database management system (DBMS). The filling system has dependably been a simple "cabinets system" and every one of the procedures of land registration have been on the same old thing which have prompted uncertainty of right of occupancy under the Land Use Act.

Having considered the land acquisition, pay and resettlement in developing economies, Oluwamotemi (2010) credited the issues of absence of earnestness in favor of government. In orderly land titling and registration, Atilola (2013) recommended the use of present day study hardwares to do demarcate boundaries. (Fadahunsi 2011), concurred that compelling land titling as a panacea for supportable land change in the study area. Oboli and Akpoyoware (2010) found that the issues of sporadic land titling

and registration are that the methods associated with the whole procedure are excessive (35 stages rather than 13 as prescribed by the World Bank (2009), (Atilola 2010), (Nuhu 2009), (Nuhu 2011), Oboli and (Akpoyoware 2010) and other accessible writing composed on the different issues radiating from sporadic and systematic land titling.Nonetheless, it is intriguing to express that few literary works have featured the issues and difficulties however, no solid exertion has been made towards tending to those issues and difficulties; While the verbiage and literary works on title registration are ample, and in addition its suggestions, examination of the writings and past investigations have uncovered a nonappearance of any strong, comprehensive and simple to-use structure that are economical in land administration in the study area.

The justification for this study came because of the fact that there is no blue print or model, static and dynamic database management system (DBMS) in the study area. Thontteh and Omirin (2015) identified a portion of the key highlights of the present land administration framework by working out an Electronic for Web Document Management System (EWDMS) for land administration system. The three noteworthy issues of high cost in land titling; lacking of aptitude staff and unequal institutional framework were not solved. Neither do the technique supported decrease in land dispute and increment in the number of applications handled per day. However, the strategy included the utilization of computer equipment and software to develop a database yet the technique essentially neglected to build up a powerful and simple to use dynamic web which would have tackled the issues of land question, institutional structure issues and the expansion in the quantity of use dealt with in order to expel the false practice in land administration system in the study area..

The situation should be turned around; changes can be incited inside or remotely roused. Change might be a sensational takeoff from what is known; changes can be expected or surprising. Change can likewise be a consistent activity, and it is constantly called for when there are inadequacy and insufficiency in procedures, frameworks, systems and projects. In every one of these cases, the fundamental idea of progress is a travel from the present state to a development state to a future state. It is, in this way, important to plan and propose a superior method for registering the title to land to energize a decent use of land, lessen the rates at which individuals' conflicts

with land property approaches and to improve an excellent exchange on land. The importance of dynamic web development in this study is that, the dynamic DBMS developed stores all the information related to the land, ownership and the certificate of occupancy in an interactive manner that can be able to share. The hoodlums that normally cluster around the Ministry of Land and Survey are completely eliminated because the whole process is online with minimum delay.

In perspective of this, this study builds up a web system to enhance the current strategy, monitoring the financing system safely, productive and successful use of information technology that empowers the adoption of LADM (ISO 19152). In addition, the model is:

i.   flexible - approaches for varying use and purpose;
ii.   inclusive - in scope to cover all tenure rights of all land;
iii. participatory - in approach to data capture; ensure community support ;
iv.   affordable - for the government to operate and for the society to use;
v.   reliable - in terms of information that is authoritative and reliable;
vi.   attainable - to establish the system with a short time frame and within available resources; and
vii. upgradable - incremental improvement over time with Database Management System (DBMS).

1.3   Motivations and the Need for Online Land Registration

One of the prime inspirations for this work emerges from the need to deal with the natural assets (land) to build up a formal approach that can be used to address the issues emerged from the unpredictable circumstances in land administration and management. The capacity to track the progression as it is connected to land everywhere throughout the years has dependably been the inspiration. The exchange on land registration emerges from the way that individual`s relationship to land has an extremely unique nature. The need to fabricate a sensible system that will has the

capacity to deal with many-sided qualities emerging from land administration, for example, land registration, titling and management. The outlines required are to represent the genuine word circumstance and in land registration with embed, and refreshing operations. Thus, data capturing, database advancement, Global Positioning System (GPS) and Global Navigation Satellite System (GNSS) are new innovations that opened the new points of view and answers for these requests which must be conveyed in LADM (Paasch *et al.* 2013) and (Paasch *et al.,* 2015).

1.4 Aims and Objectives

The aim of this study is to develop a dynamic web for land registration system towards the adoption of the Land Administration Domain Model (ISO19152 Standard) in Nigeria.

The specific objectives of this research are:

    i.   to explore and identified the current implementation with current situation in the land registration methods and the success of Land Administration Domain Model (LADM) for the subsequent adoption in the study area;

   ii.   to develop a dynamic web system for land registration with computerization of the processes and

  iii.   to analyse and perform validation test on the system for the usability within the targeted stake holders.

1.5   Research Questions

In order to achieve good results from the aim and research objectives, a number of related and oriented research questions were taken into considerations.

i.   Which methods or approaches are available in the literatures and what are the contributions to development of land administration in general.

ii.   What is the current situation and the future to come for land titling and administration in the study area?

iii.   What are the possibilities of LADM adoption in the study area?

iv.   What are the users' requirements on adoption of LADM in the study area?

v.   How to develop a flexible system, where it will be relatively easy to include new requirements or changes at any time?

vi.   How will the online land registration encourage land owners in the land registration processes?

vii.   Is there any need for 3-D or 4-D situations in the study area?

viii.   How can a specification of a relational database be done for the adoption of LADM in the study area?

1.6   Scope of Study

This study covers land registration system, introduction to relevant aspects of land administration system and LADM. Although, LADM is being used in a number of areas but there is very little information to show it has been widely applied all over the world. However, it has an appropriate platform for overcoming some of the limitations of conservative methods to land administration in the study area. The focus has been more on the general introduction of Packages of LADM and how it can be adopted according to users' requirements. The basic and fundamental knowledge in the design and development of land administration domain model (LADM) serves as the main consideration for adoption in this study area.

1.7   Thesis Organization

Chapter 1 presents an introduction that describes the concepts of land and Land administration. Thereafter, presented the problem statement, motivation, aim and objectives, scope and structure of the thesis.

Chapter 2 discusses the literature reviews of the study. It begins with the introduction and fundamental issues in LADM as a reference model, previous works on land registration and land reforms in the study area. Land administration system, the short comings and the current situations were discussed and consequently, the link between this study and other related studies were stated.

Chapter 3 started with introduction to the methodology, the research design, framework and the preliminary study. The method used in the study to acquire and collect the data were discussed.

Chapter 4 is the analysis of the field data and discussion, the three section of questionnaires were thoroughly analysed, systematic and sporadic types of land registration were discussed. In this chapter, users' requirement for LADM adoption in the study area was discussed: Also, a brief discussion on the LADM as an initiative to the study area were discussed.

Chapter 5 is the design and the development of web for land registration in the study area, the conceptual framework and the operational framework of the designed web together with the design of the home page were explained. Finally, the workability and system testing were discussed.

Chapter 6 talks about LADM into Nigerian land registration and the introduction follow by the database design for LADM_NG_LandRegistration_db. The design of the database was also discussed with the generation of Data Definition

Language (DDL) and Data Manipulation Language (DML). The composite map of the area of study was produced for the final results of the queries.

Chapter 7 is the conclusion, research contributions, recommendations and future works.

1.8   Summary of the Chapter

This chapter covers the introductory aspects of the research presented in this thesis. The chapter talks about background of the study, the study area, problem statements, motivation, aim and objectives, research questions, the scope of the study and the thesis organization. The chapter highlighs the issues and problems in the research area with regards to developing a dynamic web system for land registration towards adoption of ISO 19152 Standards in Nigeria.

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