Full Paper

An Analysis of 3D Situation as a Prospect for (LADM) in Nigeria: A Malaysian Initiative.

BABALOLA Sunday Oyetayo[1, 2*], CHOON Tan Liat[1], ABDULRAHMAN Alias[1], AYENI Winston[3] and AJAYI Gabriel[2]

[1]Universiti Teknologi Malaysia, Skudai, Johor Bahru, Malaysia.
[2]Federal University of Technology, Akure, Ondo state, Nigeria.
[3]Surveyors Council of Nigeria, Abuja, Federal Capital, Nigeria.

*omooroloba@gmail.com

Abstract

3D situation and development system of land administration is seen to be an immediate solution to land interest and land use complexity in our populated areas. The interest in land and the people relationship to the land in their Rights, Restrictions and Responsibilities (RRR) are the major challenges facing in the urban cities. 2D cadastre has proven to be incapable of handling some cities complexities and urban growth especially in the underground utilities, space above and below the surface of the earth. There is no visualization and modelling in our traditional 2D cadastre. 3D situation would help in the land administration because it is capable of storing, updating, analyzing, manipulating, quarrying and visualizing land RRR. The technical, legal and institutional aspect of 3D aspect provides a conceptual framework for the successful implementation and its development in Nigerian major cities. Therefore, this paper presents a case study approach to Malaysian 3D property situation because land administration in the two countries is similar. Malaysia has successfully developed and adopted 3D property development and implementation in most of their cities over the years. In view of this, we present the recent situation and current cadastral system as a prospect for Land Administration Domain Model (LADM) implementation in Nigeria. The successful implementation of 3D situation in Malaysia as an initiative for Nigerians was discussed. And finally, the solutions and advantages of 3D situation to the people and government of Nigeria were discussed.

Keywords: 3D Situation, LADM, 3DProperty, Land Administration

1.0 INTRODUCTION

A parcel is a cubic entity formed by the walls, ceilings and floors of a residential apartment or business premise. The centre lines of the outer boundary walls form the vertical boundaries, and the centre lines of the floors and ceilings form the horizontal boundaries of the parcel. In other words, the purchaser of a parcel purchases the internal space enclosed by the four outer walls, ceiling and floor of his parcel together with part of the structure up to the centre of the walls, floors and ceilings. It means that the purchaser also owns all the inner walls dividing the rooms inside the parcel. However, the outer structure of the building is joint property belonging to the management corporation (Choon, 2013).

The idea of the strata title is based on the horizontal and vertical subdivision of a building or of airspace, instead of the standard vertical

development of land. The lands and buildings erected upon it are divided into parcels, land parcels and common properties. Each parcel and land parcel consists of an individual apartment or house, for which a separate strata title is issued. Buildings and land that do not form parts of a single apartment. Or a house becomes joint property, managed by the Management Corporation or body corporate of the strata scheme on behalf of all the proprietors of parcels and land parcels in the strata scheme (Hussain, 1999). From the explanations above, it is understood that the strata title contains rights of property that encompass the dimension on the surface, the proportion of the surface and also the size below ground surface.

In Nigeria, effort has been gingered towards organized and computerized cadastre system where every state in the country will have a centralized system of land administration. Most land and property registration process are 2D and are paper-based system with no 3D visualization. There are has been no study on 3D cadastre and property; this is as a result of the fact that Nigeria has vast land mass. But the problem is that the lands are not increasing in size, in time and space all the available land may be occupied. Therefore, this study is a preliminary analysis of the necessities and requirements needed for implementation of 3D situation in Nigerian major cities. Also, this study looks at possible solutions to problems arising from the immediate implementation and the use of existing resources to implement them. 3D cadastral that will represent a variety of situations 2D has proved unable to meet in land administration as initiative from Malaysian cadastral system. Series of studies done on 3D all over the world by many renowned researcher, (Stoter, 2004), (AbdulRahman, Hua, & Oosterom, 2011), (Oosterom, 2013), (Vučić, Roić, & Kapović, 2011), (Jazayeri, Rajabifard, & Kalantari, 2013), (Paulsson & Paasch, 2013) and (Navratil & Unger, 2013)but no work has been done in this study area. Therefore, in session 2, the present situation and current cadastral system in Nigeria as a prospect for LADM and successful implementation of 3D situation in Malaysia were discussed, session 3 are the discussions and advantages to the people and the government of Nigeria, while session 4, is the conclusions.

2.0 THE PRESENT SITUATION AND CADASTRAL PRACTICE IN NIGERIA

Nigeria occupied 923,768km² on the coast of West Africa. It is located on latitude 4°-14°N and longitude 2°-15°E (Njepuome., 2011), Nigeria has 36 State with a Federal capital territory which is the seat of the federal government. There are 774 local Government with over 250 ethnics group speaking over 400 different languages. The whole nation is divided into 6 Geo-political Zone used for developmental planning and political appointment. The land administration and cadastral practice in each State of same geopolitical Zone are similar because of their geo- political affiliation and integration (figure 1).

Figure 1: Source: Office of Surveyor General of Nigeria (OSGOF 2011)

In (Oosterom 2013), the continuous increasing complication of infrastructure and heavily urbanized areas needs proper registration of their legal status (public or private), which the existing 2D cadastral records cannot do. The 2D plan is produced from the data obtained from analogue or digital surveying methods to produce the survey plans. Th plans usually in many pages of 2D figures and text describing both the geometric and the legal aspects of each property (Jazayeri et al., 2013). According to him the complication in nature, as a result, affects the communication of information and also resulted in ineffective and slow data creation with limited access to critical information. It varies from state to state and region to region but the data obtained comes from the surveyor using their traditional survey equipment, total station, manual theodolite and GNSS receiver. Though, the accuracy and validity of the data obtained for the field are tested before using it to avoid errors in the production of the 2D plans produced. There are many methods in which data can be acquired for 3D cadastres and 3D properties. What we need to consider is the purpose, the types and the requirements of data needed at a particular time for a particular job. (Jazayeri et al., 2013), identified five elements as Geometric, that is the geometry and shape a land parcel and building. The attributes of the land and building. Land use, the information relating to the meaning of land and property; Legal, information relating to ownership, rights, restrictions and responsibilities; Temporal, the changes over the time of the ownership. However for the developing country like Nigeria, the cost effective for whichever

method or requirement must be considerably cheaper.

In the past ten years in Nigeria, there has been an increase in land use and land allocation. Figure 2 show the changes in land use in Kubwa Federal Capital Territory Abuja Nigeria between 2003 and 2013. The situation in Ibadan, Lagos, Abuja, Kano, Kaduna, Portharcourt and Calabar is similar. The change is apparent; the implementation of this study is much more needed in the area mentioned. There are has been lots of developmental in area within the period of ten years. All the vacant land has almost been occupied because the land cannot be extended. The problem now is that available land will be unavailable soon if urgent measure is not taking. Land is a fixed asset, unmovable and in extendable, people come and go, ownership changes over time but the land remain fixed. We need to manage the land in a way that the value is maximized for the benefit of all.

Figure 2: Google imagery of Kubwa FCT Abuja Nigeria

2.1 Prospect for Land Administration Domain Model (LADM) in Nigeria

In 2007 in order to address all the shortcomings of Land Use Act of 1979. The Federal government established a Presidential Technical Committee (PTC) on land reform to undertake reform of all land problems emanated from Land use Act. The primary terms of reference of PTC is to establish a National Depository for title holdings in all states of Nigeria. Also the Federal Capital Territory and create an instrument for land valuation in both urban and rural areas in Nigeria. It will serve as data bank for multipurpose cadastral in each state and the whole country. In other word, each state in the federation will be able to communicate with each other and the federal capital since they operate the same land administration system. It is one of the fundamental requirements for land administration domain model (LADM) conformance for country profile. Already, Malaysia has designed and published their LADM country profile in line with international standard. The design of LADM covers the shared aspects of land management, worldwide. It is possible to represent all people – land relationships independent of regulations related to local approaches to adjudication, maintenance and data provision processes and also independent from local legislation, customary or informal rules. It is an international standard for land administration that was published by ISO 19152 in 2012.

Land Administration Domain Model (LADM) standard covers cadastral in a broad sense and land registration, spatial and administrative components and source documents. It also includes essential information related to components of land administration including those on the land, over water as well as elements above and below the earth surface. LADM provides conceptual schema and terminology for land administration based on both local and international system that as simple as possible so as to be useful in practices. The standard allows a shared description of different legal and informal methods that give the room for combining of land administration information from various course incoherent manners.

A number of countries have considered the adoption and application LADM to their local needs in land administration. In Europe, LADM was applied in the Infrastructure for Spatial Information (ISI) in order to prove the compatibility with INSPIRE. Also, further investigations were examined to the integration of LADM with European Land Parcel Identification System (ELPIS). Other notable works on LADM by another researcher from 2012 and 2014 includes; (Oosterom, Christiaan, & Harry, 2013), (Uitermark, 2012), (Lemmen, 2012), (Zhuo, Ma, Lemmen, & Bennett, 2013), (Shin & Kwak, 2013), (Inan, 2013), (Paixão, Hespanha, Ghawana, Carneiro, & Zevenbergen, 2013), (Paasch, Oosterom, Christiaanlemmen, & Paulsson, 2013), (Carneiro, Erba, & Augusto, 2011), (Kalantari, Rajabifard, Urban-Karr, & Dinsmore, 2013) and (Budisusanto, Aditya, & Muryamto, 2013). Consequently, one can say that

the knowledge of LADM has improved LA in Europe, America and Asian countries. The tentacles are spreading right from the Netherland to Portugal, Germany to Turkey, South Korea, Ireland. Sweden and India, down to Malaysia and gradually to Africa and Nigeria, the most populous nation in Africa.

2.2 3D Property Type in Malaysia

In Malaysia, land is limited to airspace, on surface and underground (including air space) of the earth and all substances made up that surface, the earth below the surface and all substances on the surface, all vegetation and other natural products, whether or not requiring the periodical application of labour to their production, and whether on or below the surface, all things attached to the earth or permanently fastened to anything attached to the earth, whether on or below the surface, and land covered by water.

According to (Khoo, 1984), no part of the land must be wasted. Land for development in the urban area becomes scarcer to get. It is necessary that every single piece of land be developed and utilised to its maximum capacity of that city. That is one way is to increase density in the building forms. As the parcel in the town becomes more expensive to acquire, the natural tendency is to build houses upwards. The twentieth century has seen many social, economic changes in urbanization in most countries, including Malaysia. As a result of rapid urbanization and scarcity of land, high-rise buildings have become homes to many (Hussain, 1999). The development of high-rise buildings in high-density areas is a measure to optimize the land use and enhance the living standard. In residential areas, occupants of high-rise buildings are normally small families who wish to enjoy a better lifestyle and have easy access to recreational facilities. Other important considerations are security and easy access to the workplace.

The Malaysian strata title registration, which owned its origin to the Australian New South Wales Conveyance (Strata Titles). Act 1961, was first introduced in Peninsular Malaysia on 1st January 1966 by the National Land Code 1965 (Act 56) under Section 355 to Section 374. They only dealt with subsidiary titles to each of the parcels within a building having two or more levels. With such strata titles, owners can enjoy the benefits of an indefeasible title with the right to charge, to transfer or lease their properties, in the same way, that owners of landed properties can.

The rapid housing development growth in 1970s and 1980s introduced technological advancements in the construction industry and architectural innovations, making the provisions in National Land Code 1965 (Act 56) inadequate. Hence, certain amendments were made for further improvement to cope with the need at that time. The provisions of strata titles in the National Land Code 1965 (Act 56) were amended several times in 1977 (Act A386). In 1979 (Act A444) and in1981 (Act A518) before they were repealed in 1985 (Act 318). As in other jurisdictions, prior methods of providing property rights to high rise buildings had been principally through leases and joint ownership through tenancy in common spaces.

To sum this up, in the 2007 amendment, there are three types of application to be made in the subdivision of a property. Where the use involved (a) building only, (b) buildings and land, or (c) land only. Finally, plans are afoot to enact legislations to overcome the problem of maintaining common areas in high-rise developments before the setting up of the management corporation. It will alleviate the problems of maintenance and provision of services for the residents. Hence, the Building and share Property (Maintenance and Management) Act 2007. (Act 663) came into being, along with the 2007 amendment on 12th April 2007 to provide for the proper maintenance and management of buildings, lands and common properties in a strata scheme.

The Building and Common Property (Maintenance and Management) Act 2007 (Act 663) defines collective ownership, in relation to a development area. An entity that is not comprised in any parcel, such as the structural elements of the building. Stairs, entrances and exits, corridors, lobbies, fixtures and fitting, lifts, refuse chutes, refuse bins, compounds, drains, water tanks, cables and ducts that serve more than one parcel. It also includes the exterior of all common parts of the building, playing fields and recreational areas, driveways, car parks and parking areas, open spaces, walls, and fences. And all other facilities and installations and any part of the land used or capable of being used or enjoyed in common by all the occupiers of the building. The concept of shared property facilitates identification of the part of the strata scheme that falls under the management corporation's responsibility. It is the management corporation's duty to carry out the necessary repair or maintenance on the relevant part of the building, which is part of the common property.

Parcel/land parcel proprietors in strata schemes frequently interact with each other as they enter the building's lobby, elevator, parking lot or common recreational facilities. The closer the proximity and the more frequent the interaction, the greater the opportunity for personality clashes to arise. Another remarkable thing done to sustain this system is the method of disputes resolution. Generally speaking, the Management Corporation often lacks the required toughness or mediation skills to resolve disputes. But the doors of the civil courts are naturally open to hearing these disputes. Because of excessive delays, it is indeed true that the modern world has neither the time nor inclination for the excessive delays and costliness that litigation entails. Everyone likes disputes resolved through a process, which is speedy, to avoid unnecessary absence from daily work. The Strata Titles Board was set up as a

mechanism to settle disputes amongst the parcel/land parcel proprietors and the Management Corporation as well as to enforce strata title legislation more effectively.

There are three scenarios of airspace rights. The first relates to shop houses above a public road (see Figure 3a & b). Here, the individual shop houses above the open highway are given separate titles without having any right to the ground surface. The owners of the individual shop houses are given an easement to access their properties from the adjacent properties.

Figure3(a) One Utama, Selangor (Choon, 2013)

Figure 3 (b) Komtar, Penang (Choon, 2013)

The second scenario is regarding a building (e.g. restaurant, indoor stadium) above a public road. Here, the building above the open highway is given a separate title without rights to the ground surface. But the entrance to the building (building support) and others building support (e.g. concrete beam) are given limited rights to the ground surface.

The third scenario is a sky-bridge above a canal (see Figure 4). Here, the sky-bridge is given a separate title without rights to the ground surface, but the entrance to sky-bridge (building support) is given limited rights to the ground surface. The owner of sky-bridge is given an easement to access his property from the adjacent building, or he can also have access from the entrance that has limited rights to the ground surface. The owner of the sky-bridge is allowed access through an easement from the adjacent property to access his property from two entrance points.

Figure 4; Johor (Choon, 2013)

However, there are other rights for the benefit of the citizens. Includes underground rights (Public underground parking lots, underground shopping malls, and underground roadways) see examples in figure 5a&b. In figure 5a below, there are parking lots on the underground level, level 1 to five comprises of shopping mall, offices, shops, and praying rooms while level 8 to 25 are apartments (Condos).

Figure 5 (a) Skudai Parade

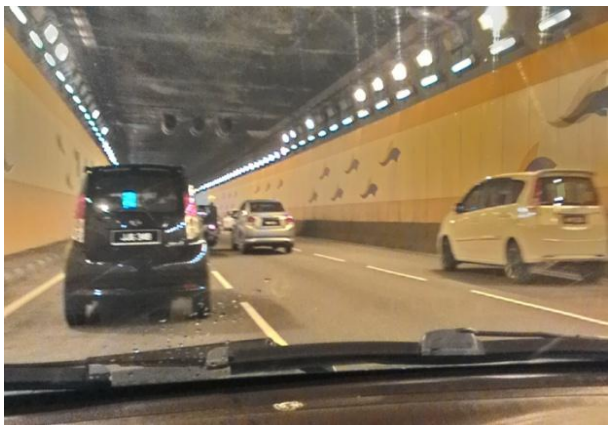

Figure 5 (b) Kuala Lumpur

3.0 ANALYSIS AND DISCUSSION

Having defined land as clearly as possible, the land administration organizational structure in Malaysia demarcates the power to manage property to the State authority as land is a State matter pursuant to the Federal Constitution of Malaysia. In Nigeria, all land in each State in the Federation are within the power of the Governor of that State, and such land shall be held in trust and administered for the use and common benefit of all Nigerians. Malaysia had already put in place necessary laws needed for 3D situation. The successful implementation of 3D situation in Malaysia began with the introduction of Strata Act in 1966 which gave owners the benefits of an indefeasible title. The first thing to do in Nigeria is to create an avenue for well-meaning individual who will want to apply for strata or condominium title.

There are should be Building and Common Property (Maintenance and Management Board) back by law as also the case of Malaysia. This committee should be scheduled with the responsibilities of defining and maintaining the common property (common area e. g corridors, staircase, etc.). The board must also be responsible for the dispute resolution, as closer the proximity and the more frequent the interaction, the greater the opportunity for personality clashes to happen in condominium apartment.

According to (Oosterom et al., 2013), Nigeria needs to define their 3D parcel and 3D situation as this depends on each country legal framework and organizational context in a particular country. In Malaysia, a 3D property unit is a bounded amount of space to which a person is entitled by means of real rights.

There is need also to amend the existing easement law to accommodate the use of the individual shop houses above the public road to be given separate titles without having any right to the ground surface. The owners of the individual shop houses to have an easement to access their properties from the adjacent properties.

Finally, there will be no benefits for this study if there is no solution suggested for the supply of water and electricity in condominium apartment in Nigeria. Independent power plants are the best and workable solution for the provision of electricity while; water could be supply through bore holes since there will be a steady supply of electricity. The monthly bill for the electricity and water should be used to service and maintenance of the engines.

The followings are among other advantages of 3D situation to the people and the government of Nigeria.

1. The country will have enough reserved and persevered land for other important purposes.
2. Tax and internal revenue collection will be made easier since large numbers of people are living together.
3. Government will be able to supply and manage social and basic amenities for the people.
4. Government and the people will make maximum use of the land.
5. People enjoy mutual benefits from each other.

4.0 CONCLUSION

A real 3D property is largely the pieces of land on the earth surface, they can be building or other permanent structure attached to the surface or extended upwards into the air or downwards into the ground. When considered land administration system of the two countries, Nigeria has prospect of developing their LADM country profile now. Nigeria as well needs to put up the necessary legislation for immediate implementation of 3D situation in cities suggested in this study because the advantages are numerous to mention.

Acknowledgement

We wish to acknowledge Surveyor Council of Nigeria (SURCON) for their financial support to author 1.

References

AbdulRahman, A., T. C. Hua, and P. V. Oosterom, 2011. Embedding 3D into Multipurpose Cadastre. Paper presented at the FIG Working Week 2011 Bridging the Gap between Cultures Marrakech, Morocco.

Budisusanto, Y., T. Aditya, and R. Muryamto, 2013. LADM Implementation Prototype for 3D Cadastre Information System of Multi-Level Apartment in Indonesia. Paper presented at the 5th Land Administration Domain Model Workshop, Kuala Lumpur, Malaysia.

Carneiro, A. F. T., D. A. Erba, and E. A. A. Augusto, 2011. Preliminary Analysis of the Possibilities for the

Implementation of 3D Cadastre in Brazil. Paper presented at the 2nd International Workshop on 3D Cadastres, Delft, the Netherlands.

Choon, T. L., 2013. Towards Developing a Three-Dimensional Cadastre for Three-Dimensional Property Rights in Malaysia. (PhD), Universiti Teknologi Malaysia.

Hussain, J., 1999. Strata Title in Malaysia: Pelanduk Publications (M) Sdn Bhd Selangor, Malaysia: 1st ed.

Inan, H. I., 2013. Associating External Land Use-Cover Information with LADM's spatial unit. Paper presented at the 5th Land Administration Domain Model Workshop, Kuala Lumpur, Malaysia.

Jazayeri, I., A. Rajabifard, and M. Kalantari. (2013, 4th- 8th November 2013). *3D Data Sourcing for land and property information A geometric and semantic perspective.* Paper presented at the Global Geospatial Conference, Addis Ababa,Ethiopia.

Kalantari, M., A. Rajabifard, J. Urban-Karr, and K. Dinsmore, 2013. Bridging the Gap between LADM and Cadastres. Paper presented at the 5th Land Administration Domain Model Workshop, Kuala Lumpur, Malaysia.

Khoo, B. K., 1984. Maximising the Potential of Land for Building Development. The Vital Issues. Paper presented at the Conference on Property Development, Kuala Lumpur, Malaysia.

Lemmen, C., 2012. A Domain Model for Land Administration. (PhD PhD thesis), Technische Universiteit Delft The Netherland, The Netherland.

Land Acquisition Act 1960 (2010). Land Acquisition Act 1960 (Act 486), Rules & Order. As at 1 March 2010.

Navratil, G., and E.-M. Unger. 2013. Reprint of: Requirements of 3D cadastres for height systems. Computers, Environment and Urban Systems, 40, 14-23.

Njepuome., A. P. C., 2011. Cadastra Land Imformation in Nigeria. Paper presented at the Workshop on New Developments in Cadastres,, Narobi, Kenya.

Oosterom, P. v. 2013. Research and development in 3D cadastres. Computers, Environment and Urban Systems, 40, 1-6.

Oosterom, P. V., L. Christiaan, and U. Harry, 2013. ISO 19152 2012, Land administration domain model published by ISO. Paper presented at the FIG Working Week 2013.Environment for Sustainability, Abuja, Nigeria.

Paasch, J., P. V. Oosterom, Christiaanlemmen, and J. Paulsson, 2013. Specialization of the LADM - Modelling of non-formal RRR. Paper presented at the International FIG workshop on the Land Administration Domain Model, Kuala Lumpur, Malaysia.

Paixão, S., J. P. Hespanha, T. Ghawana, A. F. T. Carneiro, and J. Zevenbergen, 2013. Modelling Brazilian Indigenous Tribes Land Rights with ISO 19152 LADM. Paper presented at the 5th Land Administration Domain Model Workshop, Kuala Lumpur, Malaysia.

Paulsson, J., and J. M. Paasch. 2013. 3D property research from a legal perspective. Computers, Environment and Urban Systems, 40, 7-13.

Shin, Y.-H., and B.-Y. Kwak, 2013. A Review of Korean LADM based on the Cadastre Reform Project. Paper presented at the 5th Land Administration Domain Model Workshop, Kuala Lumpur, Malaysia.

Stoter, J. E. (2004, 13 september 2004). *3D Cadastre*. Geo-information and Land Development, (PhD, 90 6132 286 3). Delft.

Uitermark, H., 2012. Status of the LADM Standardization Process within ISOTC211. Paper presented at the Workshop LADM from Research to Implementation– Land Administration Domain Modelling at a threshold, Rotterdam, The Netherlands.

Vučić, N., M. Roić, and Z. Kapović, 2011. Current Situation and Prospect of 3D Cadastre in Croatia. Paper presented at the 2nd International Workshop on 3D Cadastres, Delft, the Netherlands.

Zhuo, Y., Z. Ma, C. Lemmen, and R. Bennett, 2013. Integration of Land and Housing Information in China- first analysis of legal requirment for LADM compliance. Paper presented at the 5th Land Administration Domain Model Workshop, Kuala Lumpur, Malaysia.