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# Digital Urban Administration Model for a Traditional City (Case Study of Ibadan, Nigeria)

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## Abstract

Urban administration has been a challenge in the developing economy especially in historical traditional settlements. Growth of these cities often outstrips the capacities of urban managers to administer urban systems coupled with the fact that developments in the older parts and new areas require different strategies. Therefore it is often recommended that digital technologies be adopted to enhance administration of old and new areas in urban settings. The chapter evaluated the challenges of urban administration in Ibadan city, Nigeria from colonial period to recent urban planning systems. It advanced a model of municipal administration in a digital platform for efficient management of Ibadan city. The model is also applicable to any similar cities in the developing economy. The model recommended a replacement paper and maps approach administration to digital approach. The chapter highlighted the deficiency of the current paper and map approach and advanced efficient approach through digital technologies.

**Keywords:** urban administration, spatial data infrastructures, traditional city, digital urban administration, urban systems, physical planning, data sharing

## 1. Introduction

The challenge of urban administration particularly in the traditional urban setting like Ibadan is huge as development of these cities is constrained by many factors. The growth of cities in most less-developed economy often outstrips the capacities of the urban managers [1], coupled with the fact that outdated methods are often used to govern urban areas. The city handlers struggle to manage traditional organic urban systems with very low resources and expertise [2]. Ibadan city had adopted different styles of urban administration ranging from crude traditional approach, colonial administration method, and current post independence arrangement (Fabiyi, 2017, 2006) [3]. During the pre-colonial era, Ibadan had different quarters that were guarded and administered by the warlords or chiefs. The quarter chiefs reported to the central warlord who was an army general or Bashorun, the ultimate ruler of the territory but the Army General of the Yoruba Kingdom. Ibadan remained the military camp of the defunct Oyo Empire until the arrival of colonial government in Nigeria. The institution of colonial administration converted Ibadan city to a district under the administration of a district officer. Later Ibadan city was under the administration of the Ibadan metropolitan authority, which

superintended planning and urban administration activities in Ibadan city [3]. Under the 1976 Land use Act, the lands in the cities were put under the custodianship of the state executive governors while the custodianship of rural lands were under the control of the local government administration and the chairmen [4] (Fabiya, 2006). The state governors combine the administration of the state with that of the capital cities, a responsibility that is considered to be too burdensome for a single administration. There were no mayoral platforms or municipal administration to superintend the management of the city. Later in 1991, Ibadan city was fractionated into 11 local government area councils, therefore putting the city under the control of 11 chairmen and Head of Local government Administration (HLA), each of whom controlled a fraction of the city.

The chapter examines issues around the implementation of digital urban administration in Ibadan and proposes a model for a robust digital urban administration in Ibadan city, Nigeria. It suggests organogram, technical arrangement, and training program to ensure successful implementation considering the low resources available for such activity in a developing country like Nigeria. It identified geo databases and Urban Spatial Data Infrastructure as ingredients in achieving sustainable digital urban administration in Ibadan or any similar organic city of a developing economy.

## **2. Urban administration's historical antecedents in Ibadan city**

Urban administration according to Fabiya (2017) is a branch of public administration designated for ordering, re-ordering, regulating, and controlling urban systems and urban land uses for the purpose of human comfort, convenience, urban esthetics or city's branding, and economic and environmental sustainability. Urban administration is quite different from land administration based on the unique pivotal focuses of urban administration, which are: *human comfort, convenience, urban esthetics or city branding, and economic and environmental sustainability.*

Ibadan had been an urban area before the Colonial Administration, therefore semblance of city administration in Ibadan has been in practice prior to the coming of colonial powers. Ibadan was a military camp of the Oyo Empire, which as governed by the military prowess of Basorun Ogunmola and other successive Generalissimo in the Yoruba empire that dominated major part of the west African subregion in the seventeenth century. During colonial administration government District Officer (DO) was appointed to administer Ibadan city and the authority span Town planning and Environmental health. Paper planning was also introduced by the colonial masters. The suburb in Ibadan known as Gbagi was derived from the establishment of survey beacons by the colonial government, which was known at that time as pegging, and this was the initial approach to introduce prepared plan before implementation on the ground.

Ibadan also benefitted from a different arrangement of urban administration since the colonial era was first introduced in Ibadan. The district officer of the colonial government was in charge of town administration including the health and building sectors. After independence in 1960, Ibadan was the capital city of Western Region and was under the jurisdiction of the regional government of the day.

The regional government established metropolitan authority to control the development of Ibadan city and in 1976, during the local government reforms, Ibadan was the capital of Oyo state and was also under metropolitan authority that was fully in-charge of building and land use zoning in the city. However, subsequent local government reforms during the military era saw Ibadan fractionated

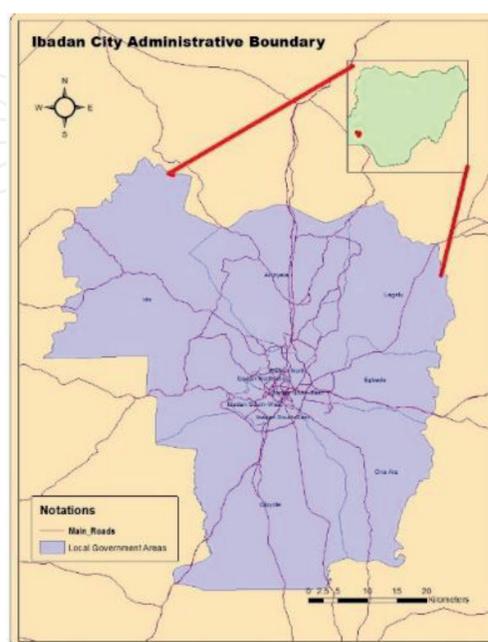
**Figure 1** shows the location of Ibadan city with the 11 local government areas. Fabiyi [5] identified the partitioning of cities into different local government areas as a major setback to urban administration in Nigeria.

The reform therefore contributed to haphazard developments in Ibadan and limited the capacities of local planning authorities to direct and monitor the development of the city. The reform also brought some form of constraints to the development of Ibadan city. Some attempts to introduce wholistic urban administration in Ibadan was sustainable Ibadan Project (SIP) by UNHabitat in Nigeria. The project was sponsored by the UNHabitat and was one of the three cities in Nigeria selected for the project, which were Ibadan, Enugu, and Kano. The city has benefited different arrangement of the comprehensive Technology assisted city administration such as Ibadan Sustainable project under the auspices of UNDP Suitable city project in 1991.

The project introduced a number of novel initiatives to improve city administration in the ancient city, but was limited because the actors were not allowed to domesticate most of the novel initiatives of the project. After the expiration of the grant project, most of the database created disappeared and the knowledge base gradually filtered away from state service. There was no concrete sustainable plan by this project for continuous learning and transfer of knowledge to the coming generation of civil servants. There was no mechanism to replace or repair system breakdown and obsolete equipment.

There were also different donor-funded projects in Ibadan such as World Bank, UNDP, and DFID among others centered on improving the city management but the knowledge and the data generated often disappeared after the expiration of the project funds.

Ibadan Urban Flood Management Project (IUFMP) was established in 2014 through a credit facility from the World Bank group. The project was a direct response to 2011 flood disaster in Ibadan that carted away millions of Naira properties and damaged many urban infrastructures in Ibadan city. The main goal of the project was to build capacity of Oyo state to respond to incessant urban flooding in Ibadan city that has become persistent for long time. The project (IUFMP) developed a series of master plans, which include Ibadan City master



**Figure 1.**  
*Administrative map of Ibadan City (source: Author's compilation, Feb 2020).*

plan, Ibadan Flood Risk and Drainage Master Plan, Ibadan Solid waste Master plan, and Ibadan Flood Risks and Early Warning Systems apart from other structural engineering interventions. These instruments produced huge data sets in the spatial data dimension, which have the potential to kick start a holistic urban spatial data infrastructure to drive digital urban administration in Ibadan city. Urban administration in Nigeria has largely been analog and data management had been through paper/hard copy exchanges. Even in many large cities such as Abuja, Lagos, Porthacourt, and Ibadan, building permits are largely done through paper drawings and exchanges of papers. In 2004, digital urban GIS was popularized by Obasanjo Administration with Abuja GIS, which was meant to deliver a robust urban administration to the national capital city. Unfortunately, Abuja GIS promised so much but delivered so little in that it regressed to mere land administration tool that could not respond to the dynamics of the rapidly growing city. Some cities also attempted urban GIS for the purpose of land administration but the huge cost expended on most of these ventures is a far cry from the products and the benefits to the societies. The states that have attempted digital land administration in form of urban GIS include Nasarawa, Kaduna, Lagos, Kano, Kwara, and Rivers among others. It is expected that these attempts at city administrations will help introduce modern mechanisms to city management in such a way that many urban problems would go away; unfortunately, however the challenges are still much in those cities.

The closest to electronic urban administration in few Nigerian cities are land information systems often christened as Urban GIS. The popular Abuja GIS and the similar experiments in Kaduna, Nasarawa, and other states have concentrated on the property titles rather than a comprehensive urban administration through electronic means.

Oyo state government had through World Bank Credit facility developed a Comprehensive Ibadan City Master plan, which also produced a robust digital database of both the existing urban component and proposed development strategies to the year 2036. The digital spatial databases delivered with the development of city master plan provided a start off point to initiate a robust digital urban administration in the city.

### **3. Need for digital urban administration in Ibadan: failure of paper administration**

There is rapid growth of population in Ibadan city; in fact it has been adjudged as one of the largest cities in Africa. However, the rapid population growth out-paced housing supply and services delivery in utilities and critical infrastructure. This is evident in the widespread sprawl and slum developments in Ibadan city. Fabiyi (2006) observed that informal sector was topmost among the land use change actors in the city. A number of authors have characterized Ibadan as a city of informal housing and virtual slum (Abumere, 1986; Fabiyi, 1999, 2006, 2016). The brown roof of Ibadan is a display of urban poverty, deteriorating infrastructure, and decrepit housing in this traditional organic city.

The agencies charged with regulating urban developments and housing sector are too overwhelmed to enforce discipline in housing sector and there are no decent alternatives to accommodate the growing poor population. The housing sector is a huge market for prospective investors but there is no reliable database that a rational investor can depend on to provide decent and affordable housing in the city. The growth of Ibadan city is predicated on the need to house the large but very poor population; therefore the city growth does not follow any predefined strategy

of planned path and is not based on predefined strategic planning. Therefore, urban developments in Ibadan are mostly uncoordinated and unregulated, which make development of slum and squalor settlements common occurrence in most parts of the city. The activities of the land grabbers and unscrupulous land speculators do not encourage real investors in housing in Ibadan because land transactions in Ibadan are notably enshrined in duplicity and fraud. In addition, there are several regulations, laws, bylaws, and edits by the state that govern Urban land administrations but lead to overlaps of functions among states and local government agencies. The consequence is that none of the agencies have the defined operational boundary nor jurisdiction to ensure that the gaps are not exploited by the general public to embark on haphazard developments. The officers responsible for development control do not have the necessary infrastructure to monitor the emergence and ensure compliance of new development to necessary laws and codes in Ibadan central city and suburb.

Informal but spontaneous unplanned developments are very rampant in Ibadan city and make it difficult to provide utilities and infrastructure by agencies of government. The residents are saddled with the responsibility of providing access road, culverts and bridges, drainages and domestic water in their neighborhoods. The provision of these critical infrastructures in the informal and spontaneous residential areas is often in parlous condition and often done with substandard materials.

There are poor or nonexistent base mapping or requisite data for city administration; usually the zonal town planning offices that were expected to verify location of building plan from the office do not have any map to work with and often resort to guess work and local knowledge of the area to approve the building plans rather than use scientific and geospatial methods to verify the appropriateness of the building proposals.

Usually, cities in developed economies do not use prescriptive form of land use such as city master plan and strategic urban plan (see [6]), but rather use market-oriented spot zoning, which is more adaptive and can adjust to the dynamics of city growth and city housing market. The 25-year prescriptive master plan developed for Ibadan city in 2018 is not sensitive to the property market nor adjustable to the orientation of government policies. The plan was due for review and update just six month into the plan adoption.

The land tenure system in Ibadan is best described as chaotic and unregulated. These account for the development of squatter settlements and building in mostly undevelopable lands such as the flood plain and the rocky and inhabitable areas, abandoned sand mines, and under electric cables tension electric cables. Because the land tenure in these areas is not reliable, most developers often build structures that can easily be demolished and evacuated. Another major issue is that because more than 50% of buildings in Ibadan are from informal sector [7], it is difficult to use the planning and management principles used in the developed economies in Ibadan because the building ownership and characterizations are often different.

Urban administrators and city planners in Ibadan are often caught between two extremes of providing housing for teeming population of urban poor and to maintain efficient and esthetically pleasing city. Therefore, when buildings were marked for demolitions because of contravention of building code, they often refrain from outright demolition of property since there are no alternative accommodations for the building owner who may be too poor to gather resources together to build or hire decent accommodation in a new place.

There is no infrastructure to support digital urban administration in Ibadan city. There is also a barrier of low resources to procure GIS technology and lack of expertise to handle spatial data information in Ibadan city. Most of the civil servants that have acquired some form of training in GIS technology and other

spatial information could not put the training to use because there is no equipment nor infrastructure to implement spatial data infrastructure. The political will of the government is weak toward the implementation of digital land administration. Effort has been directed toward revenue generation through property taxation and collection of dues from land transactions. Most of the time, the contracts for Urban GIS were awarded to foreign firms and add no value to local capacities. There is no effort to build local capacity of the civil servant to take charge of the land administration. This pointed to the fact that the land administration in the states where it is implemented is not sustainable because the civil servant in the mainstream line ministries is not integrated in the electronic land administration mechanism.

Oyo state also embarked on Oyo GIS, which is basically a land administration platform but the local content is at the pedestrian level, which was basically on data capturing. The civil servants were not trained on rudiments of database management and web applications.

Ibadan city is growing at unprecedented rate due to influx of people and businesses to the already expanding city through natural growth [8]. The influx of national government projects such as the dry port and the modern railway terminals will further accentuate the unprecedented growth of the city. The growth in population and the informal sector in the city further constraints the implementation of a robust urban administration.

The fragmentation of the city into different administrative apparatus in form of 11 local government administrations further makes holistic administration of the city more problematic.

The local government administrations in the 11 local government areas that make Ibadan city are weak and cannot tame the activities of unscrupulous developers in the city. Consequently, the city continues to grow in leaps and bounds but mainly as slums and deleterious housing with a lot of contraventions, contradictions, and infractions.

Just as roads and water pipe networks are critical for the development of the city, the digital urban administration (DUA) is critical for the overall development of a city. The government and the civil servant must see investment in DUA as the brick and mortar for good urban governance in Ibadan city.

#### **4. Challenges for implementing digital urban administration in Ibadan**

Implementation of Ibadan digital urban administration is constrained by a number of factors, some of which are enumerated as follows:

##### **4.1 Digital spatial data gap**

Data are critical to urban administration but the technology to support digital data is lacking in the city. There are also problems about the right digital technology, policies, and standards of the generation and the use of spatial data in Nigeria and particularly in Ibadan city. There is a need to acquire, process, and store all the requisite spatial data and distribute among the relevant ministries, department, and agencies (MDAs) and the general public for the purpose of aiding decision-making and attaining good governance. The integrity of the spatial data is also critical if a robust urban administration must be achieved in a low-resource city like Ibadan city. When data are shared across organization the integrity of the data may be compromised, the implementation of urban spatial data infrastructure requires the right firewall to prevent the hackers from having access to the

centralized database, which in this context will enable the different users to have ready access to the servers.

Some agencies of government collect and archive large volumes of spatial data sets and map data but are basically in analog paper format. This accounts for the reason why data sharing among the MDAs is very problematic. There are no spatial data in digital form; most maps and drawings available in Ministry of Lands and Urban Planning are outdated and there are many missing data files in different parts of Ibadan. Unfortunately, the data are often classified and restricted access is only available to selected few members of the public and the line ministries, department, and agencies. To this end, it is difficult to share data among the agencies for decision-making.

#### **4.2 Poor or no spatial data policy**

Robust data policy is a major ingredient necessary for the implantation of the digital urban administration. Data policy relates to procedures for data collection, data analysis storage and exchange among the MDAs and the general public. It also relates to categorization of data to private and public. There is data hoarding among agencies and protectionism, which thrive in a data policy void that characterize the MDAs. The data policy is important to the distribution of data in this data-green environment. Another problem that militates against data sharing among the agencies of a government is that there is no framework nor policy for data sharing and data release to the public. Currently, Ibadan city has more than 300 layers of digital spatial data made available from different projects and data base creation.

#### **4.3 Low resources for digital overhaul of electronic spatial governance**

Oyo state is constrained by dwindling resources allocation from the central government and the internally generated revenue is also not encouraging; therefore, competing demand could not allow the state to deploy financial resources for urban administration. The collection of traffic and outdoor advertisement, which have been the primary source of IGR by the local government administration, have been taken over by the state administration in order to beef up revenue generation of the state. Consequently, it is very difficult for the local government administration to have resources to invest in data sharing among the local government. Digital overhaul of governance is often the last project on the list of priorities of government. The government of the state has been struggling to invest in IT and most especially the spatial data infrastructure because the investment outlay cannot guarantee immediate return on investment.

Though the production of Ibadan City master plans and Drainage master plans generated a lot of digital databases for urban administration, the government still needs to invest in ICT infrastructure to enable data sharing and data utilizations. Most of the MDAs are not connected with internet facilities. Therefore, there is need to invest in making internet facilities available to the relevant MDAs to ease the spatial data sharing among the staff.

#### **4.4 Lack of trained personnel**

The state and the local government administrations have aging personnel who are not conversant with modern technology. Digitization of few maps and documents are taking place in the survey department and physical planning. It is necessary to train the exiting staff in the relevant ministry on the spatial data management and specifically GIS in order to implement robust spatial data infrastructures.

The training activities need to be carried out to encourage MDAs staff members to embrace the implementation of digital technology and abandon their various analog approaches to land management in different ministries.

The land use decree in Nigeria provided the custodianship of urban land on the governor of their respective state while the rural lands are basically under the purview of local government administration.

#### 4.5 Outdated equipment and low-capacity facilities

Reproduction of maps is still done by ammonia printers while cadastral maps are still stored in hard copies. There was an improvement of carting cadastral maps on a paper-plaited board. Most of the equipment procured in the past were not maintained and they have gathered dust. Some of the computer systems used in the department have 500 Meg RAM while some plotters are not functioning because the ink cartridges are out of stock.

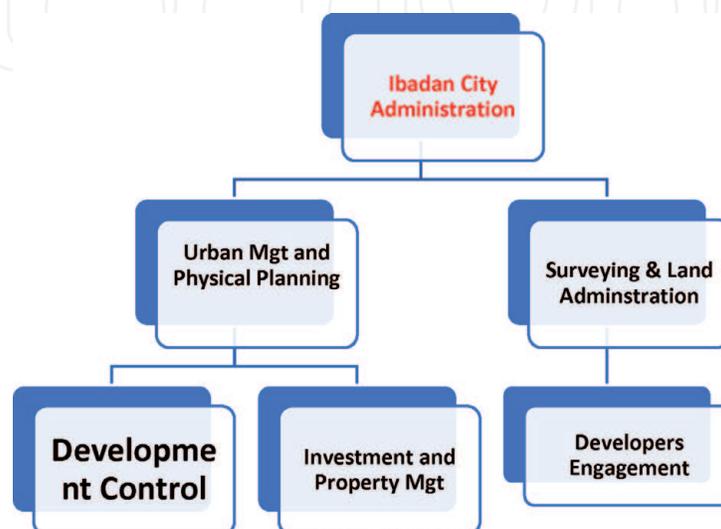
#### 4.6 Property boundaries are poorly demarcated

Many survey plans in the city have poor spatial accuracy, while some of them are fake and have no direct bearing to the land in question.

### 5. Proposed model for digital urban administration in Ibadan city

The proposed model for the digital urban administration in Ibadan city is a complete overhaul of the existing system where city administration was fragmented to 11 local government administrations. It is necessary to adopt a single administration body to regulate development activities in Ibadan city and ensure even and ordered development in the city. The model is presented in **Figure 2**.

Digital urban administration requires a very good spatial data infrastructure with a robust mechanism for data uptake and data sharing among different agencies charged with the responsibilities of regulating developments in the urban area. There are four cardinal principles of municipal spatial data infrastructure according to the framework put forward by the World Bank in 2009. This is presented diagrammatically in **Figure 2**: the proposed Ibadan City Authority will be in charge of



**Figure 2.** Model for digital urban administration in Ibadan city (author's compilation).

administrative structure of the city and will have a city manager who superintends all affairs of the authority.

There shall be two major departments, which include urban management and city planning that shall be in charge of urban infrastructure and physical planning for the city and surveying and land administration department that shall be responsible for land administration in the city.

The urban management and physical planning shall have two subunits including development control unit and investment and property management unit. The survey and land administration shall have a unit that interfaces with the developers in all land transactions and survey.

### **5.1 The proposed data sharing platform for digital urban administration**

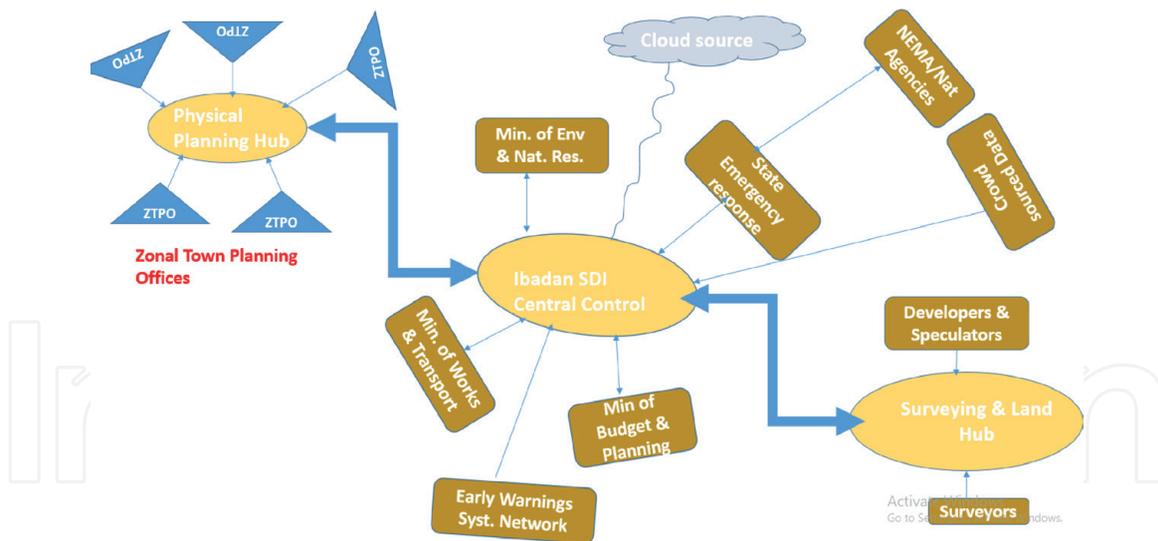
The model proposed is meant to connect data producing and data consuming agencies together. It is proposed that there should be data sharing arrangement among the ministries, department, and agencies involved in implementing digital urban administration in Ibadan city or any similar city that has traditional outlook. There are three major data nodes or what is referred to as data centers among the various ministries, one of them is the ICT that archives all the data sets and databases of the state and local government. The other node is the physical planning unit of the state that coordinates all the local governments including the 11 local government area councils that make the Ibadan city. The other data node is the surveyor general office that is in charge of land and property title administration of the city.

#### *5.1.1 Data sharing nodes for Ibadan digital urban administration*

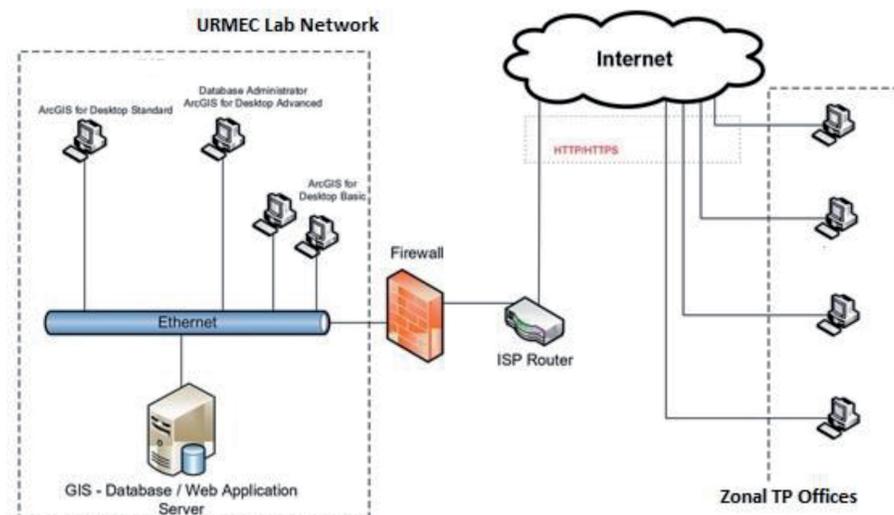
These three data centers will interact with other clienteles on data sharing. The clienteles include the public and other relevant MDAs. For instance the physical planning unit will interact with the zonal town planning offices, which are located in the 11 local government council areas in Ibadan city. It is expected that computer systems and link node would be set up in each of the local council's areas so that they can be used to communicate with these. The Ministry of Land data center will communicate with surveyors' developers and property owners in the city as well as others who are involved in land transactions in the city. There is interconnectedness among these data centers, which will be facilitated by the SDI center or ICT center of the state. It is practically difficult to actualize digital urban administration without a robust urban spatial data infrastructure. USDI will facilitate the spatial data sharing among the organizations and agencies' nodes that are generating and using spatial data in the city. **Figure 3** shows the diagrammatic linkages between of data sharing among the relevant MDAs for effective digital urban administration in Ibadan city. The figure shows that urban administration is not limited to land administration in urban area nor urban planning procedures but an amalgamation of several activities across multiple agencies and organizations.

### **5.2 Configuration of data centers**

The configuration of each of the data node or data centers is in such a way that they will have public and private component of data archiving location. It is expected that the data hubs will maintain their respective data clientiles and will contribute data to the main data center as well as supplying data to its respective consumers. The physical planning data center is patterned as shown in **Figure 4**.



**Figure 3.** Proposed urban digital data sharing among relevant stakeholders in Ibadan City (source: author's design, 2019).



**Figure 4.** Data sharing configuration with the physical planning network (source: author's design, 2019).

### 5.2.1 Physical planning data center

The physical planning data distribution configuration prescribes that data will be shared among the Zonal Town planning offices as these are the primary centres for building permits and approval. It is expected that land use plans are regularly developed by the Town Planning unit of the Ministry of Lands. The revised land use proposal plan is stored in the archives and is accessible to the zonal town planners to consult during the application process for building permit by the developers. When the applicant consults the zonal town planner for development activities, the town planners should have access to the updated version of the land use plan of the city to know the prescribed land use for the location. Access will be provided to the zonal Town Planner through security code to the server. When land use has been verified for the intended development and the permit has been granted, the planner should upload the document into the server for archiving georeferencing.

The data center will serve the zonal town planners and the general planners in the private sectors while the Surveyor General data hub will serve the

developers and the general public that require information on land and land matters.

### 5.2.2 Surveyor general office data center

The configuration of the data center located at the office of the Surveyor General (SG) is indicated in **Figure 5**. The developers and practicing surveyors will have access to the data archive and also upload spatial data on land matters to the server at the SG office to the data.

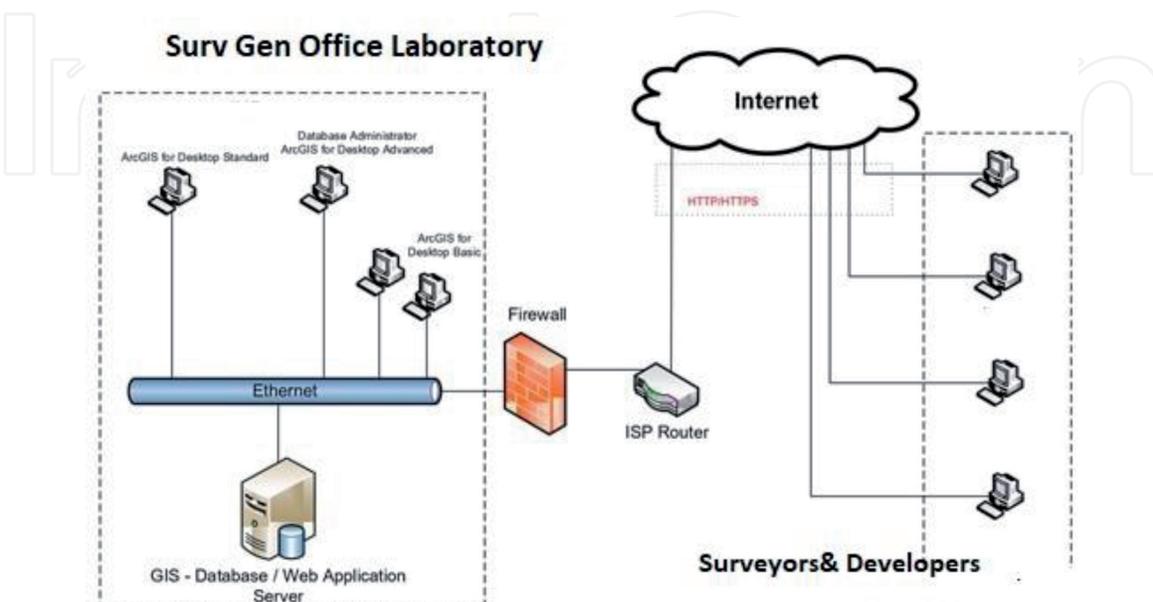
The field surveyors will need to collect geodetic datasets from the surveyor general office before they complete their measurement. When the survey exercise is completed, they are expected to send a copy to the archive of the surveyor general for reference.

## 5.3 Urban spatial data infrastructure: a major ingredient of digital urban administration

Urban spatial data infrastructure refers to infrastructure that facilitates the discovery, access, management, distribution rescue, and preservation of digital geospatial resources for urban administration. Just as critical infrastructure such as water supplies and transportation networks among others are critical to the running of the city, the urban spatial data infrastructure is the fulcrum upon which digital urban administration revolves.

Urban spatial data infrastructure is the bedrock of modern urban administration and spatial database is the most critical part of the spatial data infrastructures. Ibadan city has a lot of spatial datasets, which are scattered in different agencies and departments, most of which are often duplicated. The agencies and department are not communicating as regards the spatial datasets while they often become obsolete before they are put to meaningful use. The need to implement digital data sharing arrangement among agencies of government therefore becomes imperative.

It is expected that there will be combined implementation of USDI and DUA together in Ibadan for good urban governance in the city.



**Figure 5.**  
Data Centre at the Surveying and Land Department (source: author's design, Oct 2019).

## **6. Concluding recommendations**

The rapid development in Ibadan city encourages influx of population into the city and spikes in the housing market. Therefore, it is unlikely that the prescriptive master plan will be able to accommodate the new requirements of the upsurge of the population. However, the spatial database generated by the master plan is a veritable instrument to review and rework the master plan to meet the day-to-day challenges of the city. Planners are overwhelmed and ill prepared to respond to the dynamics of the modern city. Therefore, the current planners need to be trained in modern technics of urban administration and electronic permit systems need to be introduced.

Several attempts were made to introduce urban GIS in Nigerian cities such as Abuja GIS, Lagos GIS, Nasarawa GIS and Kaduna GIS, among others. These attempts were to address land administration and issuance of property titles in cities. It would be expected that comprehensive city management will be possible through the GIS infrastructure put in place. However most of the urban GIS implemented in Nigeria had failed to deliver on holistic urban administration.

Urban spatial data infrastructure is the backbone of digital urban administration, Therefore it is necessary to put in place a robust spatial data infrastructure framework before the implementation of urban GIS. To do otherwise is like putting the cart before the horse. This explains the failure of most of the urban GIS projects in Nigeria.

The model of digital urban administration in Ibadan city requires certain ingredients to operate fully; these are highlighted in the following section.

*Training of staff:* The MDAs staff required training on the manipulation of data and data sharing in the digital platform. Both the decision-makers, decision up-taker, and the general public as well as data users across different departments in the ministry need training to uptake the digital infrastructure.

*Internet connectivity:* Internet connection is a major constraint in the developing countries. It is however necessary that the digital urban administration be provided with the internet connectivity for data sharing and data usage. While we proposed on-site data archiving, the trend in the digital community is cloud storage of data.

*Sustained investment in technology:* There is a need for consistent investment in technology to sustain the digital governance upon which the DUA will operate. What is required is more than one-off investment but a sustained and continuous investment in critical technologies, which will require updating old ones and acquiring new ones to replace obsolete hardware and software.

*Change in orientation of key personnel:* Paper and analog methods of urban administration have been in practice for long in Ibadan and this encourages unscrupulous practices among the actors in urban systems management. The use of digital urban administration will definitely expose these practices. Therefore, there is possibility of resistance from major players; however, a robust stakeholders' engagement and orientation will help them to embrace new technologies.

The proposed model is expected to ensure smooth implementation of digital urban administration in Ibadan city and can be used in any developing economy. It is meant to address major issues around urban governance in Ibadan city and any other cities with similar conditions. Most cities in less-developed countries need to adopt digital technologies in the management of the city if they want to promote smart cities agenda. There is growing need to achieve inclusive, safe, and resilient cities and the only route to this is to adopt technological innovation for urban management.

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