Land Value Mapping an Integral Attribute for National Economic Development.

A Case Study of New GRA Idah, Idah Local Government Area, Kogi State.

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Abstract

The aim of this research was the production of land value map of the study area. It involved traversing using Total station instrument to extend controls from the Federal polytechnic Idah to the study area. The rectified Image map of the study area was obtained, scanned, geo referenced with the aid of the extended control points and digitized using ArcGIS 9.2. The computation of land values for the plots was done using the comparative method of valuation. The values and other attributes pertaining to each plot were used in the relational database model created. The cadastral overlay was amenable to the structural Query Language of the ArcGIS 9.2 DBMS. Queries were generated and each query produced appropriate result.

Key Words: Land Value, Contol point, Digitized, Comparative method, Query, ArcGIS.

Introduction

Land value maps are a graphical presentation of land values for an entire assessment unit (i.e., an entire City or Township). A graphical display of land values enables the assessor to explain and defend the results of his or her land value analyses to taxpayers. The exercise of constructing land value maps also helps keep the assessor informed of land value changes or patterns in the assessment jurisdiction. Significant information which might not otherwise be noticed often becomes apparent when land value information is presented graphically. The nature of landed property, the method of conducting transactions in it and the lack of information generally available on the transactions, all contribute to the imperfection of competition in the land property market.

Each piece of landed property is unique by reason of location. The majority of transactions in the property market are conducted privately and even if the results of the transactions were available they would not be particularly helpful in the absence of detailed information on such matters as the extent and state of the buildings and the tenure (SABMCRP 2008)

It is misleading to talk of the property market as though it were a single entity. There are a number of markets namely local, national and international. For example, residential properties required for occupation are normally dealt with locally. A man looking for a house to live in is rarely indifferent to its location because it must be conveniently situated usually in relation to his place of work and perhaps that of his wife, and to educational facilities for his children.

The market value of a particular interest in landed property may be defined as the amount of money which can be obtained for the interest at a particular time from persons able and willing to purchase it. Value is not intrinsic but results from estimates, made subjectively by able and willing purchasers of the benefits or satisfaction they will derive from ownership of the interest. The valuer must therefore, in order to value an interest, be able to assess the probable estimates of benefit of potential purchasers.

A potential purchaser is a person who proposes to tie up a certain amount of capital in land or improvements in land, and there are three main angles from which he may view the transaction. First, if he wishes to occupy the property he will be concerned with the benefits, commercial or social, which he anticipates deriving from that occupation. Secondly, he may regard the property as an investment capable of yielding an annual return in the form of income. Thirdly, his motive may be speculation; that is, buying at one price now he hopes to sell at a higher price at some time in the future and thus make a capital gain (Briton, et al. 1980).

Land Value and Its Potentials
According to Peter and Mclaughlin, (1990), the Fiscal cadastre may be defined as an inventory of land parcels that provides the information necessary to determine the value of each parcel and the tax due to it. Three major steps are identified towards implementing the Fiscal Cadastre namely discovering and identifying all parcels to be valued, and classification and determination of their values and collection of appropriate taxes.

Rudimentary cadastral arrangements have been traced to the early agricultural settlements along the Tigris, Euphrates, and Nile Rivers, where revenues for the Pharaohs and the Priesthood were met principally by an assessment of land income as revealed by Cadastral Survey. The tax was based on the principle that all land belonged to the King and all those who cultivated his land had to pay taxes in the form of rent. In later times, the Greeks and Romans developed elaborate land records and survey systems in support of land taxation.

Modern fiscal cadastral system can be traced to the tax mapping of the Italian Provinces of Milan and Mantua between 1720 and 1723. Following this, the Austrians carried out a cadastral survey between 1785 and 1789 of the entire territory included within the Austro-Hungarian Empire. In 1807, Napoleon appointed Mathematician Delambre to chair a commission whose task was:-

To survey ……… more than 100 million parcels to classify these parcels by the fertility of the soil, and to evaluate the productive capacity of each one, to bring to together under the name of each owner a list of the separate parcels which he owns to determine, on the basis of their total

productive capacity, their total revenue and to make of this assessment a record which should thereafter serve as the basis of future assessment. (Simpson, 1976).

The French Physiocrats argued that, since landed property is capable of producing an income over time and is the basis of all wealth, the revenues necessary for administering the State should be derived from taxing that wealth at source, namely by taxing the land. This approach became widely accepted in Europe, as most State revenues came to be obtained by levying a ground tax. This tax was based on the estimated taxable revenue of each parcel, the amount depending on the particular use/value of the land. The Physiocrats methods later provided much of the stimulus for large scale tax mapping in North America and elsewhere, since maps are a means by which all properties can be identified and recorded.

Land Taxation

Two different methods are used for raising revenue from land namely property-rating systems and land value taxation. With property-rating system governments raise revenue by assessing and taxing improvements, such as buildings and the uses to which they are put. Thus, a property used as a shop will be taxed differently from the ones used for residential purposes. With land-value taxation which is focus of this paper, the tax is based on the value of the land itself as determined from either its improved or its unimproved state.

McGlade, (1984) argued that a more enlightened approach to funding of local revenue involves the whole basket of taxes available and certainly involves the continuance of the property tax system in coordination with wider use of other taxes such as sales, income and poll taxes. If valuation administration were strengthened together with the enlightened use of a minimum number of differential rates, a greater equity in tax treatment amongst tax paying groups would result.

In Singapore the value tax is the second largest source of tax revenue. In 1979, it contributed 15.5 percent of the tax and 11.3 percent of the total government revenue (Geok, 1980). In United States, land value taxes yield a sum equal to 3.6 percent of the Gross Domestic Product (GDP); in Britain local rates account for 3.3 percent; In New Zealand the figure is 2.27 percent. In Australia, local rates and State land tax yield 1.46 percent of the GDP. In Germany, the land value tax levied by municipalities' accounts for 12.6 percent of their revenue but represents only 0.37 percent of GDP (McGlade 1984).

Land Value Map as a Support for Land Market.

Lands of America.com is the largest rural listing service in the Nation. The network specializes in lands for sale which includes farms, ranches, mountain property, lake houses, river homes, beachment homes, country homes, and residential homes in smaller towns across the country. These properties have many diverse uses including recreational and agricultural activities like housing, fishing, camping, backpacking, horseback riding, four wheeling, grazing cattle, gardening, vineyards, crop land, raising horses and other livestock (Lands of America.com 2013).

In the New South Wales, the Valuer General provides new land values to councils every three to four years for rating. When councils receive new land values for rating, the Valuer General issues landowners with a notice of Valuation.

The notice of Valuation records the:

- Property description details recorded on the Register of land values
-Current land value as at 1st July in the year of valuation
- Date of the valuation and
- Last date for lodging an objection.

If landowners or lessees are not satisfied with the land value recorded on the notice of valuation, they can have their land value reviewed by lodging an objection.

Certificates of Land Values

The public can obtain certificates of land value over the counter from the Sydney Metropolitan LPI Valuation Office, located at level 3 Signature Tower, 2-10 Wentworth street, Parramata for a fee.

The certificate corresponds to the current entry on the Register of land values and features the:

- Valuation district
- Property identification number
- Owners name
- Property description
- Date the valuation is made
- Land values
- Date the certificate is prepared

Land Value Search

Land and property information has launched a land value search facility to give land owners better access to land values via this website or over the counter at LPI valuation offices www.lpi.nsw,gov.au/../snw_and_values.

The 2012 Iowa land value survey, directed by Michael Duffy, Iowa State University extension farm management specialist and professor of Economics, is a topic of great interest. The 2012 land value survey covers one of the most remarkable years in Iowa land value history. The survey has been conducted annually since 1914, and is the only state wide survey that collects information on land values in each of Iowa's 99 counties. Results of the 2012 Iowa land value survey were announced at a news conference at 10 am Tuesday, December 11th 2012 (ISU 2013).

Objectives

The broad objectives of this paper is to produce a land value map of the study area.

The specific objectives included determining the value of each parcel of land along with its intrinsic factors namely the topography, nature of soil and design and condition of the improvements in it and its extrinsic factors like the environment of its location, the proximity to other land resources, the availability of transport, and the adequacy of public services upon which the value of any tract of land depends.

Materials and Methods

The study area of the project is part of the layout of the new GRA with about 291 plots. This new GRA is situated within the Idah Metropolis. it has approximate geographic coordinates of 07° $05'$ Latitude N and 05° $45'$ Longitudes E (NPC 2004).

The Method adopted in this study included the collection of the hard copy cadastral plan of the study area. The plan was scanned and digitized using the ArcGIS 9.2 version. There was an initial geo-referencing and the design for the creation of the relational database for the study area. This enabled the ArcGIS 9.2 version system to implement the necessary queries and analyses needed for the actualization of the research.

DATA COLLECTION.

The Total station instrument was used for a second order traverse to extend the primary controls situated within the premises of the Federal Polytechnic, Idah to suitable locations within the study area. The Secondary data included the analogue cadastral layout plan of the study area obtained from the Kogi State Ministry of Lands, Housing & Urban Development, Survey Division Idah Zonal Office and the Image Map of Idah sourced from Google Earth, Coordinates of the boundary pillars were generated through geo-referencing.

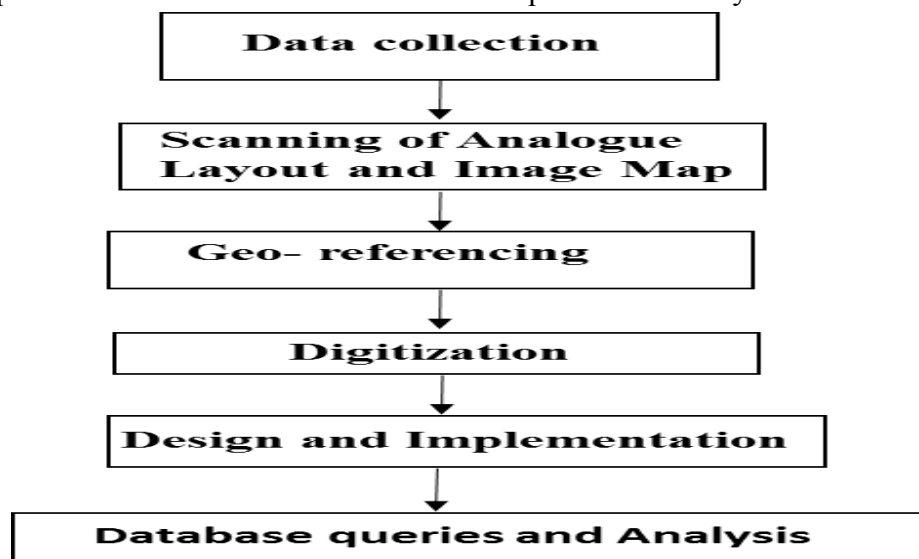Figure 1 provided the workflow of the method adopted in this study.

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│      Scanning of Analogue        │
│     Layout and Image Map         │
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│    Design and Implementation     │
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│    Database queries and Analysis │
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Fig 1- Workflow and procedures in LIS database creation (Adapted from Chiemelu & Eze, 2011).

DATA CONVERSION AND DIGITIZATION

The analogue plan of the layout and the image map were scanned with an
AO HP Scanner. Four coordinates were used for the Geo-referencing of both the layout plan and the image map. Points were used for beacons while lines were adopted for boundaries and roads, fields, parcels and administrative areas were represented by polygons. Figure 2 shows the cadastral overlay of the study area.
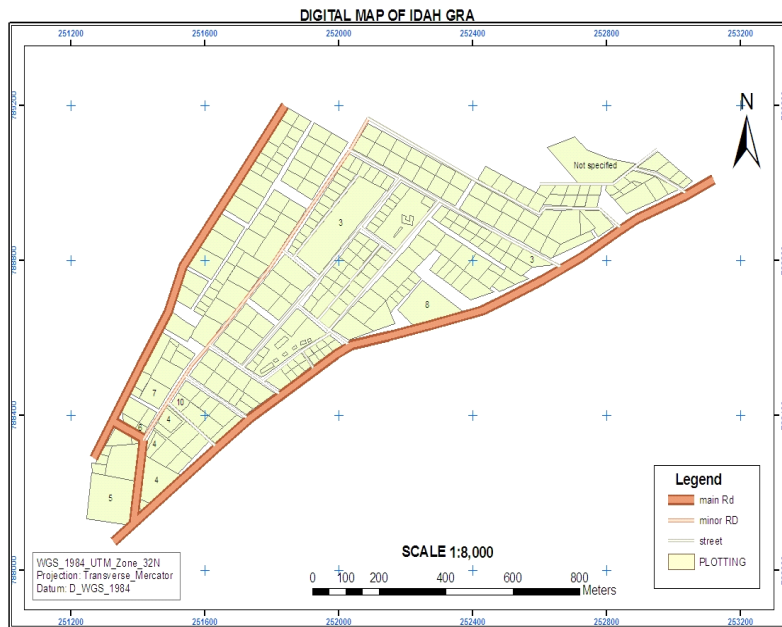
Fig 2 Cadastral Overlay of the Study Area.

Comparing the digitized cadastral overlay map of the study area with the physical site of the layout, some parcels were selected. The actual usage data of the selected parcels were recorded using the relational database approach (table 1).

DATA BASE CREATION
After obtaining the data as outlined above, a site survey was made to selected parcels and their use mapped and recorded as in table 1.

Parcel id	Area in sq m	Bli d	Use	Value Naira	Address	Pop	Fid
Plot 1	15356. 580	5	Filling station, commercia l	N40m	No 1. 0Kpachala Rd	30	2
Plot 2	8739.6 07	4	Corner shop	N10m	No 2 Okpachala Rd	10	4
Plot GT C	12044. 757	8	Playing field	N5m	Opp GTC Ajaka Rd		101
Plot 8	1816.7 39	4	Residential , storey bld	N30m	67, Ajaka Rd		10
Catholic Diocese	15888. 225		Bishop home	N100 m	Opp sch of Health Ajaka Rd		253
Kogi	24267.	3	Quarters	N102	KSW Staff	50	216

sanitary ware (KSW)	505			m	quarters		
Plot 2 Lonab Estate	2374.357	3	Residential	N250 m	No 1Kogi Govt Lodge Rd	30	130
Plot 2 local Govt Lodge	4174.820	7	Lodging	N150 M	No 3 Ibro Rd		31
Plot 6	2413.812	4	Residential	N230 m	No 5 Ibro Rd	10	21
Plot 7	1547.837		Educational	N100 m	No 6 Ibro Rd		266
Plot 1 Bk6	683.952	6	Residential	N150 m			16

Source: Author

Valuation Method
The valuation is usually derived from market price, expressed as either a capital sum or a potential income. Four methods are usually adopted for valuation namely the comparative, the income, the cost and the Residual methods. The comparative method was adopted for this study and this assumes that the market value is equal to the price recently paid for a similar property or interest in land. Adjustments were made for differences between the properties used in the comparison and changes subsequently taking place in the market. The approach chosen is the most simple and efficient means of determining market value.

The creation of the fiscal cadastre.
 The cadastre is primarily the support for land value tax. The data also provide information for the expropriation of land for government purposes and for revenue transfers between levels and departments of government.
In achieving this the following operations were done namely identification and mapping of all parcels in the estate, since a set of current property map that provide an index for compiling and maintaining valuation information is a requirement for an efficient and effective cadastre; classification of each property in accordance with an agreed set of characteristics relating to such matters as it's use, size, type of construction, and improvements; the collection and analysis of relevant market data, this included data on sales prices, rental charges, or building maintenance costs, together with details of their applicable dates; the determination of the value of each parcel using the comparative method; identification of owners or those responsible for paying the tax (Dillinger, 1986). Others which were outside the scope of this paper includes preparation of valuation bill, Billing and collecting and Appeals procedures.

The procedure involved the following:

- Establishment of base appraisal data
- Definition of neighborhood boundaries
- Gathering and verification of land sales data
- Establishment of base lot value
- Establishment of on-site development values
- Development of adjustments and finally
- Development of neighborhood land schedule.

Comparative method/Units of comparison.

Using the sales comparison method, information regarding sales of similar land were collected, verified, analysed, and adjusted to yield an indication of value for the property being appraised. The first step in land valuation was the collection of vacant land sales data. Verification of sales information is essential before recording the information on maps or in a spreadsheet format for analysis as part of the mass appraisal process (or in a standard adjustment grid in single-property applications).

In analyzing data, it was important to compare the characteristics of sold parcels such as location, highest and best use, size, etc. In mass appraisal situations, this allowed the vacant land sales to be grouped based on similar characteristics and the assessing officer then assigned land values derived from the grouping to subject properties sharing similar characteristics with the group.

Units of comparison are units of value measurement that are recognized by the market. The following units were used in this study:

- Front foot: This contributes to the value of a property and is useful in valuing downtown, commercial, lakefront, or deep water port & industrial property.
- Square foot: which is used for properties selling for an average price per square foot. It was used to value residential, commercial, and small industrial sites.
- Acreage: This unit measured the value of rural and farm properties, shopping centres.
- Site: when the market does not recognize a significant difference in lot value when there is a difference in size, the unit of companion becomes a per-site basis. Residential lots are bought and sold in this manner.

Per unit or space: Multi - family sites are often sold based on a potential per apartment unit basis (State of Oregon 2008).

Result and discussion

Using the comparative method of valuation discussed above, the value for individual plots were obtained as shown in the table 1, column 5 above.

Queries and results

Queries were applied on the database to test the efficiency of the system implemented and results were generated. Query on the plots within the layout with value less than fifty million naira (₦50m) gave four plots namely Fids 2, 4, 101 and 10. The query on the plots with value between one hundred and fifty gave five plots with Fids 253, 216, 31, 226 and 16 respectively.

Lastly query on the plots with value between two hundred and two hundred and fifty million gave two plots with Fids 130 and 21 respectively.

Discussion

For any query generated, this approach produced a result. It has shown that any type of query could be generated to solve a definite problem. Queries such as what number of persons are living on each plot valued could be applied to give its own result. This approach is adaptable to numerous queries for corresponding solutions to challenges encountered in valuation of landed properties.

Conclusion

This research has clearly shown that queries generated in the course of land value calculation would enable the system accurately determine values for any particular plot of land. For example in our overlay test, the query could identified three classes of value for the plots within the layout. This has proved that land valuation could be adopted for any plot of land. The understanding of this system would be needed for the development of the fiscal cadastre which would be useful to the government in generating the finance that are required for the better function of the government and an aid to diversification of the economy. Further the result showed qualitative, sufficiently accurate, current and accessible information about the level of property value. It provides a better orientation and transparency for all actors in the real estate market. This was made possible through the sophisticated gathering and analysis of data, use of GIS techniques. This is encouraging as it is essential part of sustainable urban development, land management and e government.

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