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Toward Sustainable Economic Growth: A Gis-Based Compliance Monitoring Of Ground Rent Payments In Northern Industrial Estate In Calabar, Cross River State, Nigeria.

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Abstract

Nigeria with its Sustainable Development Goal (SDG) 8 seeks to promote strong, inclusive and sustainable economic growth, and targets sustaining per capita economic growth in accordance with national circumstances and in particular at least 7% per annum GDP growth, and achieve higher levels productivity of economies through diversification, technological upgrading and innovation. In line with the goal, this paper applied the technology of Geographic Information System (GIS) in Monitoring the Compliance of Ground Rent Payments (GRP) in Northern Industrial Estate in Calabar, Cross River State. Analogue site plan was converted to digital form and GIS database created to capture information on ground rent. ArcGIS software was used to generate area of plots, net amount, net payment and arrears owed, then spatial queried employed to extract relevant information on ground rent compliance in the study area. Query operation was helpful in accessing the size of each plot, ground rent compliance and retrieving information regarding the yearly ground rent compliance, overall compliance from 2000 to 2010 and so on. The results showed serious disparities in the sizes of the 113 plots that made up the study area and an almost steady yearly indebtedness that accumulated to about two million three hundred and fifty-four thousand five hundred naira (N2,354,500.00) was revealed from the study. The paper concluded that despite the potency of GIS technology for efficient ground rent compliance monitoring, the technology was not integrated in monitoring ground rent compliance in the study area. Based on the findings, it was recommended that GIS database be created and updated yearly by the relevant agency or ministry for easy assessment and compliance monitoring of allottees (GRP). Also, that enforcement unit backed up with legislations should be instituted to enforce payments.

Keywords: Sustainable Economic Growth, Geographic Information System, Ground Rent, Compliance Monitoring

*Corresponding author. Utre, S. and Akan, A, Author(s) agree that this article remain permanently open access under the terms of the Creative Commons Attribution License 4.0 International License

Introduction

Globally, proper assessment of properties and efficient collection of taxes such as ground rent and others have been found to be veritable source of sustainable economic growth in terms of revenue generation for government of various countries. Several municipalities in developed and developing countries have introduced innovative technological practice into property tax assessment and ground rent administration. Developed countries of the world have really gone far in this, while developing nations are still trying to come up with it. Today, some developing nations such as Asian and African countries have adopted and implemented ground rent payment. But unfortunately, this innovation is characterized by some set-backs such as low rate of tax filing, high arrears, improper assessment of property tax, large number of un-assessed properties, wrongly assessed properties, delay in preparing the list of defaulters, non-uniform procedure of taxation, inaccurate/inconsistent data (Sewatdal, 1999).

It is also observed that in most developing countries including Nigeria ground rent valuation process has been carried out manually by Estate Valuers since the profession was introduced in the country long ago. This might be one of the reasons why the profession has been criticized for performing poorly. Valuation is said to be of poor quality when it is inaccurate, inconsistent, inefficient, illogical, unconvincing, unacceptable and unreliable. In Nigeria the process of collecting the ground rent is said to lack efficiency and effectiveness due to absence of clear methodologies in the valuation. Records are normally kept in ledger books which are in poor condition, and in multiple offices poorly maintained without the records being updated frequently (Chiemelu, 2011). With this, ground rent is very difficult to administer, enforce and to collect as such property owners, both individuals and businesses easily avoid paying rent because it is not well enforced. In view of the above, scholars such as Chritopherson (2006) suggested the use of computer-based data processing tool for gathering, manipulating and analysing ground rent payments.

In Cross River State, ground rent payments had often been hindered by unnecessary duplication of data, lack of security, standards and coherent data management. The need to create a reliable and all-embracing geospatial database for ensuring adequate compliance monitoring of ground rent payment in the study area is therefore necessary to avert the huge losses in government revenue.

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The Study area

Northern Industrial Estate is in Calabar Metropolis of Cross River State, Nigeria and is located between Latitudes $5^{0}1^{1}05.4^{11}$ and $5^{0}1^{1}52.0^{11}$ North of the Equator; and Longitudes $8^{0}19^{1}3.5^{11}$ and $8^{0}19^{1}44.14^{11}$.11 East of the Greenwich Meridian (see Fig. 1).



Fig. 1: The Study Area Map

Review of Literatures

Kayuza (2006) analysed the processes of property identification, valuation and the collection of property tax revenue. The study explores property owners perceptions of property tax. Property owners' views were collected from Magomeni, Sinza, Mbezi Beach, Manzese, Kimara and Makongo Juu settlements in Dar_es Salaam. The analysis of data covered both quantitative and qualitative evidence obtained from the field. Subsequently the data were processed and analysed using the SPSS. Data analysis output in the form of descriptive statistics and cross tabulation was interpreted so as to establish the context of the meanings of the responses and their implications to the study objectives and questions. Also, statistical tests were carried out to find significant differences between the studied groups. Analysis of qualitative data in this study was based on the examination and categorisation then interpreted so as to provide explanations for the themes identified in the interview guide. The explanations were helpful in understanding property taxation as practised in Dar es Salaam and reveal that property tax generate very low levels of revenue when measured against the potential. This is a result of inadequacies in administration of the tax. Property tax coverage is low as large proportions of the property tax base are not valued and less revenue is collected from rateable properties captured in the property tax database. The study further observes inadequacies of non-supportive relationship among the key actors in property taxation. Property taxpayer's express resistance to paying their tax bills on account of receiving little benefit or none in return for the taxes they pay. The observed deficiencies with the property taxation practice call for the urgent attention of the relevant municipal authorities if the property tax is to achieve the full potential.

Also, Mohamed, Mnguu, Mwatawala, and Mandara, (2011) in assessment of property tax collection in informal settlements using geographical information system (GIS) and

Remote Sensing (RS) technology in Temeke Municipality: a case of Keko Ward, aimed at identifying the registered informal property in the study area using GIS technology and examine the effectiveness of GIS and RS in property tax collection from the settlements. Sample 97 property's owners (taxpayer) and a total of 10 key informants (Mtaa executive offices were selected for interview. He obtained Spatial data through the use of satellite images and informal parcels details from IT database known as Municipal Revenue Collection Manager (MRECOM). Control point was surveyed and georeferenced using Garmin 12 handheld Global Positioning System (GPS) with accuracy of 0.05 mm. Then unique Parcel Identification Number (PIN) was established to link the mapped parcel polygon with the database. Collection of property tax in informal settlements was based on thematic maps showing payments status, type of property, and use of property as well as defaulters of the tax. The results revealed that adoption of GIS improved property tax collection by 77% from 2007 to 2010. GIS and RS were also found to be very useful in capturing property tax defaulters thereby improving revenue collection.

Materials and Methods

The study was designed to use GIS based technique in the compliance monitoring of ground rent payments in the study area using spatial and non-spatial data. The ArcGIS 10.5 software was used to manipulate, create attributes and analysed the data using query operation. Below is Figure 2 which shows the schematic representation of the research design.

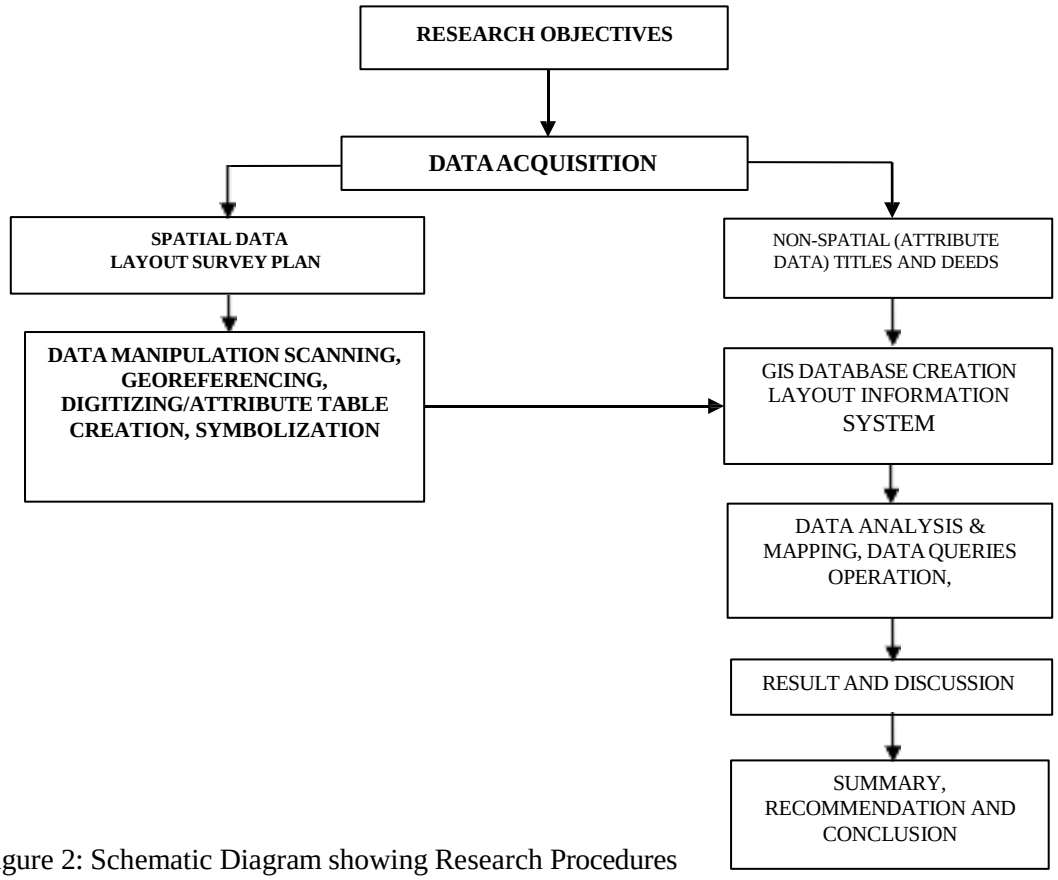

Figure 2: Schematic Diagram showing Research Procedures

Table 1: Data Types and Sources

SN	Data	Identification	Scale and Date	Sources	Quality	Format
	cation ordinates	ojected ordinates TM)	vember 13	rmin GPS reading m the field	Good	Digital
	alogue site n	rvey plan Northern ustrial Layout	00 plan . 242	rvey Department oss River State nistry of Lands and wn Planning	Good	Analogue
	wnership gister luation Data	ed Register	-	nds Department nistry of Lands and wn Planning	Good	Analogue
	ound rent yment records	yment Register	-	nds Department nistry of Lands and wn Planning	Good	Analogue

Source: Researcher, 2025

Analogue copy of the northern industrial estate plan was converted to digital format and imported into ArcGIS 10.5 software environment where it was georeferenced, digitized and attribute created to integrate both spatial and non-spatial data. Fields such as plot ID, plot/company's name, plot size (area), types of business, amount valued/taxed, yearly ground rent payment/compliance, etc. were added and the data so collected were captured accordingly.

The areas for each plot were generated using the calculation geometry while Net-Amount of ground rent meant to be paid by each of the company for the period under investigation (2000-2010), Net-Payment made and Arrears Owed were calculated with Field Calculator in ArcGIS 10.1.

Queries were performed on the database to extract relevant results from the study. Summary of the queries carried out on parcels attributes were as followed:

i. Which properties have not paid their yearly ground rent?
ii. Which properties have not paid their ground rent in the last 5 consecutive years?
Which properties have not paid their overall annual ground rent up to date?

Results and Discussion

The database created was queried to reveal the yearly pattern of compliance by the allottees (companies). For the year 2000, the query operation carried out as indicated in Fig. 3 showed that 108 out of 113 allottees complied while four (plots 6, 21, 36, 63 and 100) defaulted. Query for the year 2001 revealed that out of 113 allottees, 39 occupying plots 2, 3, 8, 9, 12, 13, 17, 18, 21, 23, 26, 30, 31, 34, 39, 40, 41, 42, 47, 50, 51, 52, 53, 54, 57, 64, 66, 68, 70, 72, 78, 85, 87, 88, 93, 97, 102, 103 and 111 did not comply. (See Fig. 4).



Fig.3: Layout showing compliance in the year 2000



Fig.4: Layout showing compliance in the year 2001

In the year 2002, a total of 49 allottees comprising of plots no. 3,4, 8, 9, 12, 13, 15, 16, 17 18, 21, 23, 25, 26, 29, 31, 33, 34, 36, 37, 39, 42, 47, 50, 51, 52, 53, 57, 63, 64, 66, 68, 70, 72, 73, 76, 78, 80, 83, 84, 85, 87, 89, 93, 97, 100, 103, 106 and 111 failed to comply (See Fig. 5). While 44 allotees with plots no. 5, 6, 9, 12, 13, 15, 16, 17, 18, 23, 25, 26, 28, 29, 30, 31, 34, 37, 39, 40, 44, 50, 51, 52, 53, 57, 60, 63, 64, 68, 72, 73, 76, 78, 80, 83, 84, 85, 88, 89, 97, 100, 103 and 111 defaulted in the year 2003 (See Fig. 6).



Fig.5: Layout showing compliance in the year 2002



Fig.6: Layout showing compliance in the year 2003

It was also revealed from the query analysis that, forty six (46) allottees out of 113 in 2004, forty three (43) in 2005, fifty (50) in 2006 and forty seven (47) in 2007 defaulted in the payment of their ground rent and as shown in Figures 7, 8, 9 and 10 respectively.



Fig.7: Layout showing compliance in year 2004



Fig.8: Layout showing compliance in the year 2005



Fig.9: Layout showing compliance in the year 2006



Fig.10: Layout showing compliance in the year 2007

Furthermore, forty five (45) allottees defaulted in 2008 and 2009, while thirty seven (37) defaulted in 2010 (Figures 11, 12 and 13).



Fig.11: Layout showing compliance in the year 2008



Fig.12: Layout showing compliance in the year 2009



Fig.13: Layout showing compliance in the year 2010

Table 2: Summary of Yearly Pattern of Ground Rent Payment Compliance

Year	Complied	Not Complied
2000	108	5
2001	74	39
2002	64	49
2003	69	44
2004	67	46
2005	70	43
2006	63	50
2007	66	47
2008	68	45
2009	68	45
2010	76	37

Source: Researcher 2025

In assessing allottees that have not complied in the last five consecutive years of the study (2006 to 2010) and it revealed that only eleven (11) allottees with plot no. 12, 16, 28, 57, 64, 73, 76, 83, 85, 88, and 97 (Fig. 14) that have not complied.



Fig.14: Layout showing allottees plots that have not complied in the last five consecutive years (2006-2010)

Also, a further query performed on the database to identify allottees with up-to-date compliance (those paid completely for the eleven years of this study - 2000 to 2010) indicated that only 34 allottees with plot numbers 7, 10, 14, 19, 22, 24, 27, 43, 45, 49, 55, 56, 59, 60, 65, 67, 71, 74, 75, 81, 82, 86, 90, 91, 94, 96, 98, 101, 104, 107, 108, 110, 112 and 113 complied fully to payment of their ground rent while the remaining 109 allottees defaulted in either a year or more (Fig.15).



Fig.15: Layout showing allottees plots that have fully complied from 2000-2010

From the study, it was discovered that the Government of Cross River State is being owed a total ground rent of two million three hundred and fifty-four thousand five hundred naira {(N2,354,500.00) during the period under investigation. For the year 2000 the Government is owed N25,000, for the year 2001 N195,000, and for the year 2002 N245,000. The sum of N220,000, N230,000, N215,000, and N250,000 is being owed for the year 2003, 2004, 2005 and 2006 respectively. In the last four

years of the study it was also revealed that Cross River State government is being owed N258,500 for 2007; N247,000 for 2008; N247,000 for 2009 and N222,000 for the year 2010}. An almost steady pattern of yearly indebtedness by the allottees was observed throughout the period exception for the year 2000 (base year). This implies that a huge sum of money has accrued in the account of the allottees over time that would have boasted the internally generated revenue and sustained the economic growth of the Government of Cross River State.

Conclusion

The application of Geographic Information System (GIS) techniques as a decision support system cannot be over emphasized. The Compliance Monitoring of Ground Rent payment in Northern Industrial Estate in Calabar, Cross River State GIS technique provides a quick, easy, and efficient way of storing, updating, analyzing and assessing ground rent compliance by allottees in the study area against the cumbersome practice of storing, in files and folders. The analysis showed that almost all the allottees complied in the first year plots were allocated to them except 5 defaulters which subsequently increases by the years and that much money were indebted by the allottees over the years. Despite the importance of GIS technology in cadastral management, not much has been achieved in the use of the technology for monitoring ground rent compliance in the study area. It is therefore concluded that GIS is a potent tool for efficient ground rent compliance monitoring in this era of digital revolution.

Recommendations

Based on the findings, the following are recommended, Digital GIS database should be created and updated yearly by relevant agency or ministry for easy assessment and monitoring of compliance by allottees, revenue enforcement unit should be created to enforce ground rent payment compliance by allottees and Legislations should be instituted to help prosecute ground rent payment defaulters.

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Conflicts of Interest

The authors declare no conflict of interest.

Authenticity

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