E-ISSN: 2612-4793
Print-ISSN: 2612-4815

Journal of International Cooperation and Development
www.richtmann.org/journal

Vol 5 No 1
May 2022

RICHTMANN PUBLISHING

Research Article

Received: 14 December 2021 / Accepted: 20 March 2022 / Published: 5 May 2022

Geographical Information System (GIS) Application to Property Valuation Practices in Port Harcourt Metropolis of Rivers State, Nigeria

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DOI: https://doi.org/10.36941/jicd-2022-0002

Abstract

Technology has in the recent years been vehicle for improving effectiveness and precision by different professions in an attempt to achieving the best practice by these professions. One of such technologies which can employ to aid Estate Surveying and Valuation practice is Geographical Information System (GIS). Valuation of properties including real estate and other assets have often been carried out through the application of manual methods which is often found to be cumbersome and sometimes not producing accurate and reliable results. It is in realization of the inherent deficiency entailed in the application of manual approach in carrying out valuation that this study seeks to investigate the application of Geographic Information System (GIS) to the art of valuation practice in Nigeria using Port Harcourt Metropolis of Rivers State as a case study with a view to ascertaining its inherent benefits to valuation practice. To achieve the aim of the study, questionnaires were administered to seventy-four (74) estate surveying and valuation firms randomly selected in the study area. Presentation and analysis of data was done using mean and relative important index. Finding from the study revealed that estate surveyors and valuer are quite aware of the inherent benefits of the geographical information system (GIS) to property valuation, but only very few of the Estate Surveying and Valuation firms make use of it in their valuation practice. The study further revealed that majority of the Estate Surveying and Valuation firms were willing to adopt its use if only they could gain better understanding of its application to valuation practice as its application is bound to having positive effect on the practice of Estate Surveying and Valuation profession. Based on the findings, the study recommends that training should be held to equip estate surveyors and valuers with the required skills for the application of geographical information system (GIS) since empirical research has shown that it has potential of enhancing valuation practices.

Keywords: *Geographical Information System (GIS), Property Valuation, Port Harcourt, Nigeria*

1. Introduction

The practice of Estate Surveying and Valuation profession is one of such professions that require thorough work and critical analysis for accuracy and reliability in all of its aspects. The practice has evolved over the years and involves carrying out such services as property management, property valuation, property agency, property development, and auctioneering amongst others. The methods of carrying out some of these services have also been seen to have evolved over the years culminating in the introduction of technology with a view to improving the services. For instance, property management and data storage has since moved from traditional documentation of files to usage of property software. Also, in property development, the methods currently being used in building construction has made it easier through transitioning from the manual method of building construction to the use of technology and artificial intelligence. In agency, physical sourcing or scouting for properties is being taking over by different property sites through which one can source one's desired property. The art of measurement has also moved from the use of such instruments as measuring tapes to the use of the Geographic Positioning System (GPS) and other artificial intelligence systems in valuation.

Generally, technology has in the recent years been helping at improving effectiveness and precision of various professional practices. One of such technologies which have aided the Estate Surveying and Valuation practice is Geographical Information System (GIS). Geographical Information System is an assemblage of hardware, software, data, people, and methods in an arranged and result oriented manner in the acquisition, keeping, management, illustration, scrutinization and spatial display of the referenced data. In the words of Culley and Kivilahti (2010), GIS is a computerized database management system used by spatial or geographic coordinates to record, store, retrieve, analyze and view location-defined data. They went further to note that the real estate industry needs reliable data as well as reliable analytical data tools and confirmed that GIS can provide this better than the conventional statistical tools. What GIS does is mainly to work with the maximum data available so as to provide needful information on a subject. However, such data must be connected to a specific location on the surface of the Earth to do this. The advent of GIS has been very useful for the survey and valuation of the estate practice. In property management, property information and data storage are very useful for keeping records and information for estate surveying and valuation practice. Using GIS in property management according to Culley and Kivilahti (2010) is ideal as geographical data on properties could be arranged and stored in the system and connected to big data. They also noted in their study that portfolio analysis used GIS to evaluate property investment efficiency, and there are various ways of measuring property investments including total return, profit, and capital gain growth, etc., which are spatially tested to detect geographic patterns or time series trends.

In Valuation of buildings, analysis of the property in question becomes important as this is what provides the valuer with data with which to arrive as the value under consideration. Presently, most estate surveying and valuation firms in Nigeria are still carrying out their valuation assignment using manual system, but which ought to have given way because of the present digital age. A systematic, orderly and automated system of carrying out inspection and valuation properties needed to be introduced which may entail spatial and non-spatial data collection to enhance effective property valuation in the word of Ali and Shakir (2012). Manual system of valuation which entail physical visitation and inspection of site(s) with a view to taking measurement of the property(ies) and collect other relevant data for the purpose of coming up with the opinion of value of the subject property(ies). In very large sites, this process could be cumbersome. According to Eboy and Samat (2014), property valuation using manual process could be energy exhausting, time consuming and costly for large area and many other properties. To address problems inherent in manual valuation approach has resulted to the less for developing a model of property valuation that can help to determine the property values of large areas in a short time with little effort and low cost. Eboy and Samat (2014) noted in a study that manual methods of valuation like comparison, cost and investment methods have been previously used however due to new technologies, GIS tools now includes the spatial analysis methods which will give a more accurate information on property. In Nigeria, valuation is often required for such purposes as mortgages, insurance, sale/purchase, rental, compensation and many more. The valuation process entails intentional and concentrated effort. One of the most important parts of this process is site inspection. During site inspection, measurement is often carried out to be used for calculations. Even after site inspection, analysis needs to be carried out in the environment of the property and its location. The whole process is often very tasking especially for large areas of land. Adaptation of digital device and its benefits in form of GIS helps a lot. The problem which agitates the mind of the researcher and prompted this study has to do with the continuous usage of manual method of valuation which is often found to be cumbersome and sometimes not accurate. It is in view of the above that this study is set out to investigate the application of Geographic Information System in the art of valuation practice in Port Harcourt Metropolis of Rivers State, Nigeria with a view to ascertain its inherent benefit to valuation practice.

2. Review of Literature

Property valuation is the art and science of giving an opinion on the value of the property (ies) based on knowledge and experience of real estate and other assets by Estate Surveyors and Valuers. When performing a reliable estimate, the Valuer must use the approaches set forth in the International Valuation Principles (IVS) as posited by Ferlan, Bastic and Psunder (2017) in order to calculate the value of properties.

Udechukwu (2009) described Valuation as the art and science of determining the worth or value of properties for a particular purpose at any given date. He went further to note that the major goal of valuation is to ascribe a value to the use and satisfaction of a property.

Ekenta and Iroham (2014) described valuation as a process of estimating the value of the property for a given purpose at a given time, based on the characteristics of the property, taking into account all the factors that could affect the value of the property. Baum and Mackmin (1981) as quoted by Ekenta and Iroham (2014) viewed valuation as a method of calculating the future return of interest in land, the return of which will be reflected in the present value. Valuation may be divided into two classes which are statutory and non-statutory valuations. The statutory valuation is that type of valuation which are carried out in accordance with the constitutional rule and regulations laid down in the law guiding them, such as valuation for compensation, rating and probate purposes, amongst others. The non-statutory valuation on the other hand are those valuations which are carried out without any formal legislation directing how they are carried out. These include valuation for sale, mortgage, and insurance purpose (Ashaolu, 2016).

There are varying factors that often influence the value of a property. Property value may be affected by several factors but the main influences are use or usefulness, valuation purpose, valuation period while other factors include location, accessibility, scale, shape or layout, single or multiple frontages, site geography, nature and quantity of interest, proximate property, direction of development, government intervention (Ashaolu, 2016). Cellmer, Senetra and Szczepanska (2012) reported that the nature of greenery, trees, water and the organization of these spatial features directly or indirectly affects the attitudes of the consumer and the value of the property. Olayinka, Funsho and Ayotunde (2013) observed that property value is an intrinsic part of property markets around the world, influenced by a number of factors, and that the estimation of these factors constitutes an important part of property valuation. They also identified factors influencing property values to include age, location, scale, community characteristics, economic development, population, transportation, etc.

2.1 Historical Background of Geographical Information System (GIS)

The history of GIS dated back to 1854 when there was an outbreak of cholera in London, England, as a result of British surgeon in person John Snow began mapping outbreak areas, roads, land boundaries, and stream lines with a view to demarcating the affected areas. By the time he added these elements to the diagram something unusual happened, he found that the Cholera cases were mostly clustered along the water line. John Snow's Cholera map was a major breakthrough in geography and public health as this was not only the beginning of the geographical research, but also the beginning of research in the area of epidemiology the study of disease transmission. Between the

period 1960s to the 1980s, GIS experienced serious ground breaking era. The term Geographical Information System was first used in the year 1968 by Roger Tomlinson in his paper titled "A geographic information system for regional planning" and as such he is recognized to be the father of GIS. The Cartographers (map makers) in the 1960s started making use of GIS using electronic technologies in mapping with a view to making GIS the flexible toolkit that it is today. Before, automated GIS was only accessible to companies and organizations that can afford to acquire expensive computer hardware.

Nevertheless, aerial photography pioneered cartography; the real shift for remote sensing did not come until the size of the survey could be expanded to include very large areas and when imaging was complemented by other sophisticated instruments capable of capturing more than just visible light. However, this had to wait until the 1970s, when enough of the satellites were effectively put in stationary and revolving orbits around the planet. In earlier days, GIS equipment was mainly used for defense purposes, although later, wings were applied to other areas.

The need by man to find meaning for interpreting the data of his environment through GIS is linked to the survey and involves the use of data. These data cannot be transmitted manually, so we need a system for transferring data from one form to another. People defines GIS based on purpose and capacity. Wakaba and Nyika (2015), described GIS as a marriage between computerized mapping and database management systems (DBMS) and it entails building a database with both geometric and attribute data. They also stated that it's a mixture of spatial and non-spatial data that is geo-referenced to the coordinates of a given projection system which provides an accurate positioning of structures on the surface of the earth and preserves the spatial relationship between the mapped structures. As a consequence, frequently cited data may be overlaid to establish the relationship between data components. According to Fadahunsi (2010), Geographic Information System (GIS) is a computer system that tracks, stores and analyzes information on the features that make up the Earth's surface. He went further to note that GIS produces two-or three-dimensional images of an area which display natural features such as hills and rivers along with artificial features such as roads and power lines. GIS is designed to accept geographic data from a range of sources, including maps, satellite image, photographs, and statistics.

Linne and Cirincione (2010) viewed the use of GIS in real estate, as it enables users to capture, store, analyze and visualize information on real property data points of interest in a map or geospatial context. They also stated that Geographic Information Systems have, for the most part, been open to real estate professionals for more than 20 years, with developer systems incorporating data across different layers.

2.2 How Does Geographical Information System (GIS) Work

There are two main geographic models by which Geographical Information Systems (GIS) works and they include vector data and raster data. In Vector data, every geographic entity is represented by line, point and polygon. Line features can be defined as all linear features built up of a straight-line segment made up of two or more coordination. The line is represented by a beginning point and end point (two x, y coordinate points) plus a possible record indicating the display symbol. Point entities are represented by x, y coordinate pair, apart from x, y coordinate other data must be stored to indicate what type of point it is. The location of a place can be represented as a coordinate point. Polygon features are defined by a set of closed coordinate pairs; a whole university can be represented as a polygon. In vector representation, the storage of the vertices for each feature is important, as well as the connectivity between features.

In raster data, the data is represented in form of grid or pixel or picture element which comprises of an array cell. The data represented is the virtual presentation of reality (real world).

2.2.1 Geographical Information System (GIS) Task

When we talk about task, we mean the different function the GIS is designed to perform. GIS is meant to perform tasks which entail passing through many processes among which include data input, data manipulation, data management, query/analysis and visualization.

1. Data Input: Data input has to do with information that is fed into a data processing system. Data entry is a type of data input that includes all-encompassing terminology for any task that needs information to be inserted into the system in a number of ways. In GIS, the data must be implemented in a compliant digital format (i.e. digitization) before any spatial data can be used. Current GIS technology has the ability to completely automate this process for major projects using scanning technology; some manual digitization (with a digital table) could be needed for smaller work. Now many spatial data types are GIS-compatible. These data can be obtained from data suppliers and submitted directly to the GIS.
2. Data manipulation: Data manipulation deals with the processing of raw data into a shape that can be used by humans. In order words, it means changing the data from one type to another. GIS technology offers a broad variety of methods for the retrieval of spatial data and the unweeding of redundant information. GIS data manipulation involves data validation and editing, structure conversion, geometric, integration, map enhancement, buffer generation, data searching and retrieval, browsing, query and windowing.
3. Data management: This considers the GIS-based on its capacity to be collected, checked, installed, secured and interpreted and to maintain its usability, durability, and timelines to meet the needs of the data user. This covers all forms

of data preparation, collection, review, recording, and preservation that take place at all levels of the analysis. Data management is the role of its reliability in the execution of its activities. Geographic data can be saved as basic files for small GIS projects. However, as data sizes thrive and the number of data users increases to more than a handful, it is better to use the Database Management System (DBMS) to help process, organize and handle data. DBMS is nothing but computer software for handling database-integrated data collection.

4. Query and analysis: A query is an inquiry or a question for details on something. This requires posing questions to correctly access the information and often happens in the form of a sentence or a rational phrase. Thus, to request GIS to perform any analytical procedure. The program must be capable of selectively scanning and retrieving the required data according to as many parameters as possible.
5. Visualization: The final result is better visualized as a chart or graph for many forms of spatial activity. Maps are very useful for processing and transmitting spatial knowledge. While cartographers have been making maps for decades, GIS provides modern and exciting opportunities to expand the arts and science of cartography. Map presentations can also be combined with documents, three-dimensional views, raster images and other applications, such as multimedia.

2.3 Geographical Information System (GIS) Application to Valuation Practices

Yalpir, Durduran, Unel, and Yolcu (2014) have said that the valuation process is not adequate due to the regional requirements for large amounts of spatial data. In this article, an ANN and MRA model for property valuation was developed using a geographical information System. Data from 300 properties are obtained based on a model developed to determine property values and price factors. Model results in ArcGIS 10 tools were applied and were associated with thematic MRA model maps and market values for the final period. The result reveals that the ANN model, because of its shape, produces comparable results in market price value predictions. Based on the findings, this model is used to generate values for other fields. It may also be a good foundation for incorporation by being implemented into the GIS.

Gatheru and Nyika (2015) in their study observed that the valuation of property is not being adequately carried out. The study discussed the use of GIS for property appraisal. The data was derived from surveys of a sample size of 100 parcels of ground with a population of 400 parcels. The descriptive study design was designed to investigate the relationship between the valuation of the land and its impact factor; the independent variable was associated with the dependent variableness using multivariate regression analysis. The findings showed a fair and consistent approach to hedonic pricing in property valuation.

Demetriou (2016) also in his study noted that land assessment using approach manual to be expensive, inefficient and not effective, as a mass assessment process carried out in Cyprus. To deal with the issues found, an automatic valuation model (AVM) was proposed as a new GIS-based system for land valuation in soil consolidation schemes. Three separate tuning models are developed and tested: a linear and a nonlinear hedonic price model, and an ANN model paired with a GIS. Their effects are tested. As opposed to traditional land valuation approaches, AVMs showed highly effective as they can substantially minimize their time and energy while having a greater process efficiency and accountability.

Droj and Droj (2016), identified the challenges arising from the continuous use of the statistical model for the valuation of the property value, as a result of this different valuation method proposed and used during that period, such as the automated valuation model (AVM) and the computer-assisted mass appraisal (CAMA). The research discusses the probability of combining GIS, Cadastral data, and valuation models for the valuation of land. GIS with Computer Assisted Mass Appraisal (CAMA) was applied to three separate residential properties. The outcome showed that GIS-based CAMA is capable of property valuation. The researchers propose that the GIS dependent CAMA would be a better assessment in Romania.

As a consequence of this different calculation process, such as the Automatic Valuing Model (AVM) and CAMA, Droj, and Droj (2016) identified difficulties resulting from the frequent use of a mathematical model for the estimation of the property value. The study explores the likelihood of integrating GIS, Cadastral data, and land valuation models. Three separate residential properties are subject to GIS using a Computer-Aided Mass Assessment (CAMA). The results showed that CAMA based on GIS would determine land. Researchers propose a better valuation in Romania of the GIS-related CAMA.

Eboy and Samat (2016) observed that property assessments are currently carried out on a routine basis in Malaysia using traditional methodologies and are carried out manually. To address the problems the paper tested how correctly the OLS potential in the development of the Kota Kinabalu residential property appraisal model is. The analysis gathered a complete range of residential property appraisal data for 14,520 DBKK data for the entire city. However, only 5,625 documents were maintained for review after data washed and lost or unfinished data was deleted. The model was developed through the application of the Ordinary Least Square (OLS) version 10.1 and ArcGIS with its Ordinary Least Square spatial statistics components for analyzing and generating the output. The result shows that the OLS model explains roughly 50.4% of the property tax benefit. Since the model provides mediocre results (only 50% accuracy), other approaches can improve this.

Auwal, Hamza, and Ilijasu (2018) stated that a new approach was introduced to conduct a mass assessment using a single property valuation. The research aims to establish a mass assessment model of house price determination in the metropolitan of Kaduna with MRA. The thesis has followed an approach to quantitative analysis, data

from five registered property survey and valuation firms in Northern Kaduna. The data included purchase values and associated residential property physical characteristics spanning the period 2011–2015 (5 years). One hundred and six (106) valid residential transactions were obtained for this time, with their acceptable attributes, and the sample size was created. MRA was used to analyze data obtained on residential property purchases. The model has been tested for property taxes and found to be appropriate for calculating the house price. The study was found to be of help land surveyors and valuers develop technical valuation skills.

Aladwan and Ahamad (2019) have analyzed work on particular research on the use of GIS in hedonic pricing models over the last decade. They strive to recognize the holes in the GIS hedonic price model that concentrated on reliability, precision, time-savings and commitment to improving the valuation process.

3. Study Area

For this research and its scope, the focus of the research field is Port Harcourt in the State of Rivers, Nigeria. Port Harcourt was founded in 1912 as the capital of the State of the Rivers. It lies in the Niger Delta, near the Bonny River. The region is on the co-ordinates: 4 ° 49’27’N 7 ° 2’1’E, 360 km2 in region. Port Harcourt is the second largest harbor complex in Nigeria with the Bonny oil terminal and Onne’s new harbor complex. It is also the hub of the country's oil industry and the headquarters of international petroleum and gas firms in the national economy. All these aspects have consequences as an economic hub and a region into which many people move from all parts of the world and Western Africa, resulting in pressure on the capital available.

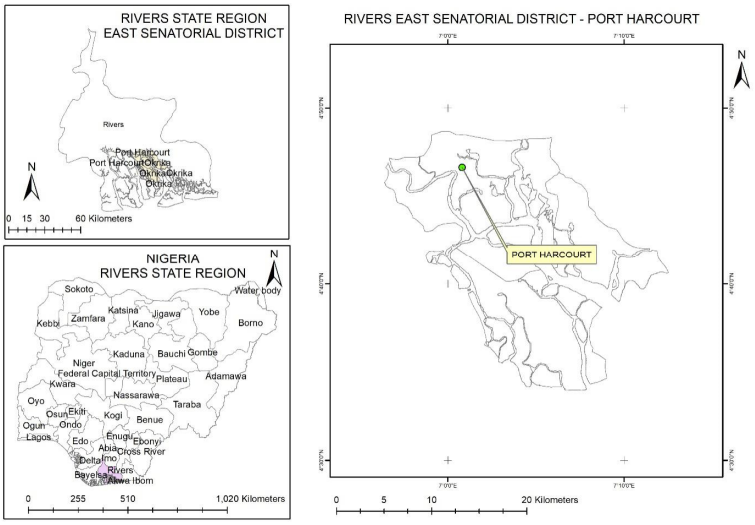

Figure 1: Map layout of Port Harcourt.
Source: Arcgis

4. Research Method

The study adopted both qualitative and quantitative research methods because of the nature of the study. Questionnaires were used to seek for Estate Surveyor and Valuers' opinion and views on Geographical Information System (GIS) and also on the level of application of Geographical Information System (GIS) in valuation practices. To this end, seventy-four (74) Estate Surveying and Valuation firms having their offices located in Port Harcourt were randomly selected for the study. Data gathered from the respondent Estate Surveying and Valuation firms were analyzed with the aid of both descriptive and inferential statistical tools such as relative importance index and mean ranking.

5. Data Analysis and Discussion

5.1 Data Presentation

To achieve the aim of the study, 74 questionnaires were administered to estate surveying and valuation firms with offices in Port Harcourt metropolis of Rivers State out of which 63 copies representing 85.13% of the total questionnaires retrieved and which were found useful for this study.

5.2 Demographic Analysis

The Demographic analysis used frequencies and percentages in the distribution of the demographic characteristic of the sample employ for this study. These characteristics include; gender, Working Experience, qualification, Years of Establishment, and position of respondents.

Table 1: Demographic Distribution of Respondents

Parameter	Subdivision	Frequency count	Percentage Distribution	Percentage Cumulative
Gender	Male	50	79.37	79.37
	Female	13	20.64	100
	Total	**63**	**100**	
Working Experience	1 – 10 years	40	63.49	63.49
	11– 20 years	17	26.98	90.47
	21 – 30 years	6	9.52	100
	31 and above	0	0	100
	Total	85	100	
Professional Qualification	Fellow	1	1.59.	1.59
	Associate	50	79.37	80.96
	Probationer	12	19.05	100
	Others	0	0	100
	Total	**63**	**100**	

Parameter	Subdivision	Frequency count	Percentage Distribution	Percentage Cumulative
Academic Qualification	OND/HND	5	7.94	7.94
	B.Sc/B.Tech	49	77.78	85.72
	M.Sc/M.Tech	7	14.28	100
	Total	**63**	**100**	
Years of Establishment	1-5	9	14.29	14.29
	6-10	30	47.62	61.91
	11-20	23	36.51	98.42
	21-30	1	1.59	100
	Total	**63**	**100**	
Status of Respondent `	Principal Partner	4	6.35	6.35
	Branch Manager	11	17.46	23.81
	Partner	3	4.76	28.57
	Estate Surveyor	45	71.43	100
	Total	**63**	**100**	

Table 1 shows the bio-data of the respondents. The analysis indicated that 79.37% of the respondents were male, while 20.64% were Female. This implies that, there are more male top estate surveyors and valuers engaging in private estate surveying and valuation practice in Port Harcourt, Rivers State. The analysis further shows the working experience of the respondents that 63.49% of the respondents as having worked for 1-10years, 26.98 of the respondents have also worked for 11-20years while 9.52% of the respondents have worked for 21-30years.

With respect to the professional qualifications of the respondents, the table above shows that 1.59% of the respondents are Fellows while 79.37% are Associate while 19.05% of the respondents are Probationer members. In term of academic qualification the table shows OND/HND constitute 7.94% of the respondents, B.Sc/ B.Tech consists of the majority of the respondents as they made up 77.78% of the respondents while respondents with M.Sc/ M.Tech constitute 14.28% of the total respondents. This suggests that majority of the respondents as represented by B.Sc and B.Tech are engaging in private practice.

With respect to number of years of the establishment of the respondent estate surveying and valuation firms, analyses shows that 14.29%, 47.62%, 36.51%, and 1.59% of the firms have been in existence for 1-5 years, 6-10 years, 11-20 years and 21-30 years respectively which implies that majority of the respondent firms has been in existence for over six years. A period which long enough to have been able to acquire the knowledge about Geographic Information System (GIS) to aid their valuation practices. The last parameter shows the status of Respondent within the sampled firms. Principal Partners constitute 6.35% of the respondents, the Branch Managers consist of 17.46% of the sampled respondents, Partners constitute 4.76% of the respondents while

Pupil Estate Surveyor constituted 71.43% of the respondents which implies that majority of the respondents are Estate Surveyor in each firm.

5.3 Awareness of GIS to Valuation Practice by Estate Surveying and Valuation Firms Practicing in Port Harcourt Metropolis

The Likert scale of 1 to 5 was assigned to the parameters used to ascertain the level of awareness of respondents to Geographical Information System. The scale 1 represents respondents who strongly disagreed with the stated parameters, 2 stands for those who disagreed, 3 symbolized a neutral standing point, 4 and 5 respectively were for those who agreed or strongly agreed with the stated parameters**.** The outcome of the analysis shows the mean of each parameters which was ranked to ascertain the respondents' level of awareness.

Table 2: Awareness of GIS to Valuation Practice by Estate Surveying and Valuation Firms.

S/N	VARIABLE	SA	A	UN	D	SD	Mean	Rank
1	The application of GIS enhances valuation practice	26	22	10	3	2	4.0635	1st
2	Geographical Information System (GIS) software is used by estate surveyors to enhance valuation practices	34	11	4	8	6	3.9365	2nd
3	There is a level of awareness of Geographical Information System in valuation practices	21	12	7	9	14	3.2698	3rd

The above table shows the respondents' opinion concerning awareness of GIS to valuation practices. There are 3 items on the first objective as shown in table 2 and responses on these items are presented with the means score to each row of data. From the mean score, it shows that the respondents are aware of the application of GIS enhance valuation practice which had the highest mean rank of 4.0635, showing that the respondent have an high level of awareness of Geographical Information System. It was ascertained that the respondents were aware that Geographical Information System (GIS) software is used to enhance valuation practices which was next in rank with a mean rank of 3.9365 and this shows its high level of awareness on the application of Geographical Information System. Lastly, the respondents were sampled with a view to assess their level of awareness of Geographical Information System in valuation practices which had a mean rank of 3.2698 showing that they have a high level of awareness on the application of Geographical Information System. From the above information, it revealed that Estate surveyors and valuers are highly aware of the application of Geographical Information System on valuation practice.

5.4 Application GIS to Valuation Practice by the Respondent Estate Surveying and Valuation Firms

To attain the second objective of the research, a Likert scale of 1 to 5 was assigned to the parameters used to ascertain the level of usage of respondents to Geographical Information System. The scale 1 represents respondents who strongly disagreed with the stated parameters, 2 stands for those who disagreed, 3 symbolized a neutral standing point, 4 and 5 respectively were for those who agreed or strongly agreed with the stated parameters**.** The outcome of the analysis shows the mean of each parameters which was ranked to ascertain the respondents' level of usage.

Table 3: Application GIS to Valuation Practice by the Respondent Estate Surveying and Valuation Firms.

S/N	VARIABLE	SA	A	UN	D	SD	Mean	Rank
1	I often used GIS in valuation practices	10	7	0	29	17	2.4286	2nd
2	GIS is used in other aspect of the firm operation	8	5	9	27	14	2.4603	1st
3	There is a level of usage of GIS in valuation practice	3	7	4	34	15	2.1905	3rd

Estate Surveyors and Valuers indicated the level of usage Geographical Information System. (GIS) in valuation practices. The information shows that Geographical Information System (GIS) is used in other aspect of the firm operation with a mean rank of 2.4603 has a moderate level of usage for other aspect of real estate. Parameters with the 2nd and 3rd position showed that the respondents don't often use Geographical Information System (GIS) in valuation practices and they indicated there is a level of usage of GIS in valuation practice, which accounts for the sources from which a low level of usage is derived.

5.5 The Factors Militating Against the Application of GIS to valuation practices.

In an attempt to answer the last objective, the researcher made a list of factors that militate the usage of GIS to valuation practices using a Likert scale with 5 as Strongly Agree, 4 as Agree, 3 as Neutral, 2 as Disagree and 1 as Strongly Disagree while using the Relative important Index and ranking to ascertain individual opinion.

Table 4: Analysis of the Factors Militating Against the Application of GIS to Valuation Practices.

S/N	VARIABLE	SA	A	UN	D	SD	RII	Rank
1	Cost acquisition of GIS soft and hardware as factor militating against the usage of GIS in valuation practices	27	19	9	3	5	0.7905	2nd
2	Lack of technical knowledge militates against the usage of GIS in valuation practices	18	34	3	6	2	0.7905	2nd

S/N	VARIABLE	SA	A	UN	D	SD	RII	Rank
3	Lack of availability of data as the factor militating against the usage of GIS in valuation practices	17	31	9	1	5	0.7714	4th
4	low level of awareness militates against the usage of GIS in valuation practices	35	20	3	-	5	0.8540	1st
5	Lack of qualified staff militates against the usage of GIS in valuation practices	8	26	10	5	14	0.6286	5th

The table 4 above shows of the ranking of the factors which the sampled Estate Surveyors and Valuers as being militating against the deployment of GIS to valuation practices. The analysis showed the low level of awareness with a relative importance index of 0.8540 as the greatest challenge militating against the application of Geographical Information System to valuation practice. The cost of acquisition of soft and hardware and lack of technical knowledge were both ranked 2nd with RII of 0.7905 amongst the factors militating against the deployment of GIS to valuation practices by the sampled Estate Surveyors and Valuers. The problem of lack data availability was ranked 4th with an RII of 0.7714 while lack of qualified staff with RII of 0.6286 was ranked last amongst the factors militating against the application of GIS to valuation practices by the respondent Estate Surveyors and Valuers.

6. Conclusion and Recommendations

The findings from this study revealed that estate surveyors and valuer are very much aware of the importance of geographical information system (GIS) to valuation practices but inspired of the potential of GIS to valuation practice the system has a minimal level of usage in estate surveying and valuation firms. But the study equally showed that the Estate Surveyors and Valuers would be willing to adopt its application if only they can gain proper training.

Findings from the study further revealed low level of awareness, exorbitant cost of acquisition of GIS soft and hardware, lack of technical knowledge and problem of access to relevant data to be among the top factors militating against the deployment of Geographical Information System (GIS) to valuation practices.

To address the problems, find to be militating against the deployment of GIS to valuation practices amongst the sampled respondents, the following recommendations are proffered;

First, seminars and awareness campaigns need to be employed by the Nigerian Institution Estate Surveyors and Valuers and Estate Surveyors and Valuers Registration Board of Nigeria (the two bodies saddled with regulating estate surveying and valuation practice in Nigeria) to enlightened professional Estate Surveyors and Valuers on the benefits of Geographical Information System to real estate practices in Nigeria;

Second, there is need for the training of the practicing Estate Surveyors and Valuers with a view to equipping them with the skills necessary for application GIS to valuation

practices;

Lastly, there is the need by educational institutions responsible for the training of future Estate Surveyors and Valuers to include the study of GIS in their curriculum with a view to creating avenues for better understanding of its application to valuation practices.

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