

An Appraisal of the Adoption of GIS in Facilities Management by Real Estate Professionals in Lagos State

Kehinde Adetoyese Adeyemi, Christianah Adeola Adu & Adedamola F. Audu

Department of Estate Management, Joseph Ayo Babalola University, Ikeji Arakeji, Nigeria.
kaadeyemi@jabu.edu.ng

Abstract

Facilities management is a multi-discipline profession. In Nigeria the Estate Surveyors and Valuers are actively engaged in the practice of facilities management. The activities involved in facilities management are enormous and if not properly managed may pose a problem rather than achieving the objective(s) of the investment. GIS is a viable tool to solve some of the problems faced in facilities management. This paper sought to examine the level of adoption of GIS by the Estate Surveying and Valuation professionals in Nigeria, using Lagos state as case study, and identifying the factor(s) responsible for the level of the adoption. Questionnaire were prepared and distributed to the firms of registered and practicing Estate Surveyors and Valuers in Lagos state. The method of sampling collection used in this study was Systematic sampling. Data were collected from 25% of estate firms in Lagos state. The percentage of retrieved questionnaire was 93%. This was analyzed using descriptive statistics. The findings from the study reveal that the Real Estate professionals have positive perception to the use of GIS in their day to day facility management practice but with low adoption rate. The reasons for this was revealed by the study and they include, low level of awareness, inadequate technical manpower, huge cost of capital required, non-willingness to change from previous method used, insufficient properties in company's portfolio that can justify the use of the system. The study concluded by recommending that the Real Estate professional should embrace the vast opportunities offered by the application of GIS in facility management.

Keywords: Facilities Management, GIS, Estate Surveyors and Valuers, Lagos State

Introduction

Geographic Information System popularly known as GIS deals with the collection, management and administration of geospatial data. It is used for obtaining, handling and presenting spatial data in ways and manners that will satisfy the users' needs (Longley et al, 2005). The adoption of GIS technology in the area of facilities management is a challenge to developing countries such as Nigeria. The spatial capabilities of GIS have enabled it to be very invaluable in facility management (FM). FM is one of the various functions of an Estate Surveyor and Valuer in Nigeria. FM has a lot of data to deal with as its operation runs from the initial design of the

building through the day to day maintenance that cover the lifespan of the building.

Estate Surveyors and Valuers is a profession which is statutory enacted by the Estate Surveyors and Valuers Registration, Etc Decree No. 24 of 1975 (CAP. E13LFN 2004) to carry out duties affecting interest in land and landed property, as specified in part II of the act. FM is one of the services rendered by Estate Surveyors and Valuer to both public and private sectors of the economy. Other services include Property Management, Valuation for different purposes, Feasibility and Viability appraisals etc. The interest of the FM is geared to ensuring that the building run as effectively as possible with consideration to

the space utilization, safety of the occupants, cost reduction and improve productivity. These may not be the focus of a property manager whose interest will be mainly rent collection, renovation and general maintenance of the building (Deyan K. 2015).

The emergence of GIS has made possible the ability to search for, query, analyze and report numerous geospatial data electronically via the web through the click of a button using GIS software enabling facilities to meet today's needs and stay competitive in the market. GIS is therefore an essential tool necessary for the Estate Surveyors and Valuers in carrying out their assignment as a facility manager as it seamlessly integrate numerous data on infrastructural facilities and respond to incidents quickly and effectively. The research sought to assess the level of acceptability and usage of this tool by the Estate Surveyors and Valures in Nigeria, using Lagos State as case study.

Literature Review

Facility Management

Facility Management was recognized as a discipline in early 1980 following the establishment of International Facility Management Association (IFMA). Since then the Facility Management has been well embraced as a result of its ability to integrate the physical assets of real estate with the unstructured asset of facilities services (Linda et. al., 2001). Facility is not limited to office building, it include structures like hotels, shops, sport complexes, hospitals, governments institutions, and all other revenue generation establishments.

Facilities Management (FM) is assumed to have been in existence for a long time. The use of the term FM cannot be traced to a source but from literature review, the term is said to have originated from US. According to Anna- Lissa (2005), FM originated from US in the late 1800s. It was traced to American railroad companies who were then providing facilities as against providing buildings. Large commercial and industrial buildings normally require wide-

ranging installation such as lift, conveyors, central cooling system etc. Operation and management of all these special installations require a specialized skill to ensure the effectiveness of the building. Meeting up with this global change plays a major role in the evolution of Facilities Management. (Owen 1995: Ojo 2002) stated that the use of computer was popular in the 1960s as the means of achieving the management of these special installations.

In Nigeria FM was not known, until in the eighties when it was introduced through the activities of some multinational companies like Chevron and Mobil Nigeria Plc. These organizations managed their Facilities in-house by assigning the management of their assets to an administrative officer. The responsibilities of this officer will include, advising the management on any decision on property; preparing maintenance budget; ensuring health and safety of the users of the building; and supervision of maintenance activities. These are roles and functions of facilities management which could either be assigned in house or outsourced.

The life cycle of facilities within a work space is greatly affected and enhanced by the use of GIS. Organization can as well gain efficiency and effectively reduce cost through the use of GIS. (Arabinda, and Chadetrik 2013) affirmed the effectiveness of GIS throughout the life span of buildings and the capacity of the application to provide information on both the inside and outside of the building. They further stated that GIS helps facility managers to improve maintenance management of facilities and resources.

GIS as a Key Tool in Facility Management

Spatial visualization is a key function of GIS in FM. This enables the Facilities Manager to take prompt decision on all the available building spaces as it is capable of presenting data visually and enable the study of its spatial relationship. There has been an extensive use of this in FM in public sector with great potential for use in private sector. With GIS innovation, computation

and provision of historical evidence, accommodation details including structural and finishing details of real properties can be assessed electronically.

The organizing and intergrading feature of GIS has assisted in closing the separating wall between the outside and inside of building facilities. This integration through GIS has made it possible to access every business process that may occur inside buildings. Olaniyi, et al (2006) whilst stating that there is no effective “management without measurement”, argued that the invention of GIS will overcome the limitation inherent in the manual system of management. Currently with the use of GIS, information are provided in three dimensional with right measurement.

There different software developed for effective GIS depending on the use and purpose. These soft wares include Autodesk, Bentley, ESRI Inc., GE (Small world). Pitney Bowes (Map Inf), and Intergraph. According to Steiniger & Bocher (2009), depending on where any of the software is going to be applied, each has specific application domain. They stated further that while ArcGIS and ESRI Inc. product may be suitable for business analysis and environmental applications, Autodesk and Bentley products are used in facilities management

Few counters, authors have emphasized on the importance of GIS to facilities management. According to Arabinda and Chadetrik (2013), when GIS is incorporated with other tools like Building Information Model (BIM), Integrated Workplace Management System (IWMS), and Computer Aided Facility Management (CAFM), a greater efficiency and satisfactory accuracy is achieved. GIS integration can further reduce real estate transactional cost and development cost. Another study was carried out by Marion and Patroba (2014) on GIS Application in Facility Space Management with International Livestock Research Institute (ILRI) as the case study. The study assessed

the optimal use of allocated spaces in the organization whether they are under or over utilized. The study found that GIS is very efficient in space management.

The need for this study becomes necessary as GIS in Facilities management remains one of the areas where less attention is given to in Estate Surveying and Valuation profession. The position of these professionals on the adoption of this technology in facilities management will form the basis of this study.

Study Area

Lagos State is a prominent place in Africa and the world. It was the former capital of Nigeria and presently recognized as the Commercial, Financial and Business hub of Nigeria and Sub-Sahara Africa. The State served the role of Federal Capital to Nigeria from April 1968 to December 1991. Nevertheless, the state remains the economic hub of the country.

The State has a lot of facilities that scattered round the city. Most of these facilities are found in places like Ikeja, Lagos Island, Victoria Island, Ikoyi, Lekki etc. Even though the capital of the nation was moved to Abuja, the rate of facilities development in Lagos is high compare to every other state in the country, except the Federal Capital Territory which may be at par.

Lagos State is one of the 6 states that form the South-Western part of Nigeria. The State shares boundaries with Ogun State, Oyo State and Ondo State. It is located approximately on longitude 2 42'E, 3 42'E and between latitude 6 52'N and 6 22'N. Lagos State covers land area of 3,577 Square Kilometers, representing about 0.4% of Nigeria's landmass of 923,773 sq.km.

Lagos State bureau of Statistics (LBS) shows that the population of Lagos is about 22.5 million with growth rate of 3.2% per annum. The United Nation ranked Nigeria as the 3rd Largest Mega City in the world with a projection of 24.5m for Lagos State by 2015 at a growth rate of 6-8% per Annum.

Material and Methods

Descriptive research design survey method was adopted for the study. The research is an exploratory survey on the topic to assess the perceptions of the professional Estate Surveyors on the application of Geographic Information System in Facilities Management Practices by these professionals. There is dearth of research on this aspect of the profession; hence it is necessary to do explanatory research to examine the perception on the relevance of GIS in facilities management practice. Explanatory research is conducted when no previous studies is available to refer to. This is to provide an insight to the current study. The population of the study comprised the 348 Estate Surveying and Valuation firms in Lagos State Branch as provided by the NIESV Directory (2018). The sample for the study was selected using, a systematic random sampling technique. Yamane (1967) formula was used to calculate the sample size. This is shown below:

$$[n = N/k + N (e)^2 \text{ -----}]$$

(1)

Every 4th firm was selected from the list of the Estate Surveyors and Valuers. A total of 87 firms, representing 25% of the population of the study were selected. Structured questionnaire was adjusted for

data collection with oral interview. Empirical survey approach was used for this study and the findings analyzed using descriptive statistics.

Results and Discussion

Data obtained were analyzed using SPSSv21 while frequency distribution and Weighted Mean Score (WMS) were used for presentation of the result. This was achieved by assigning numerical values to respondent's rating on factors identified. The WMS method was adopted to subject ranking using the Likert Ranking Scale for simplicity and ease of communicating result. Amongst the 87 Registered Estate Surveying and Valuation firms (25% of the total population was sampled). Only 81 firms returned their questionnaires, representing 93% of the distributed questionnaire.

Detailed information of the respondents

We have considered the Estate Surveyors and Valuers to include the Principal Partner, Branch Manager, Resident Estate Surveyor and Valuer in this study. The background information for Estate Surveyors and Valuers that participated in the study are shown in Table 1.

Table 1: Detailed information of the respondents

S/N	Question asked	Response	Frequency	Percentage
1	Designation of Respondents	Principal Partner	20	25%
		Branch Manager	45	55%
		Resident Estate Surveyor	16	20%
		Total	81	100%
2	Respondents Academic Qualification	P.hd/M.sc	5	6%
		Bachelor of Science	22	27%
		Higher National Diploma	39	48%
		National Diploma	15	19%
		Others	0	0%
		Total	81	100%
3	Respondents Professional Qualification	FNIVS & RSV	15	19%
		ANIVS & RSV	41	51%
		ANIVS Only	17	21%
		Graduate/Probationer	7	9%
		Others	0	0%
		Total	81	100%
4	Period of practicing by Respondents	1 to 3 years	5	6%
		4 to 6 years	15	19%
		7 to 10 years	16	20%
		11 years and above	45	56%
		Total	81	100%
5	No of Branch offices	None		
		1 – 5	47	58%
		6 – 10	25	31%
		11 and above	9	11%
		Total	81	100%

As revealed from Table 1, 25% of the respondents were principal partners of the firms, 55% were branch managers, 20% were resident Estate Surveyors and Valuers with an educational background to practice the profession. 6% of the respondents were Post graduate (such as P.hd/M.Sc), 27% were B.Sc/B.Tech holder, 48% were HND holder, and 19% were ND holder. From the table, it can also be observed that 19% of the respondents were Fellow of the Institution and are Registered members to practice the profession (FNIVS & RSV), 51% were Associate of NIESV and are registered to

practice (ANIVS & RSV), 21% were Associate yet to be registered (ANIVS), and 9% were Graduate/Probation. 6% of the respondents had working experience ranging from 1 – 3 years, 19% of the respondents have been in practice between 4 – 6 years while 20% have been in practice between 7 – 10 years, and 56% have been in practice for over 11 years. 58% of the firms have between 1 – 5 branches, 31% have between 6 – 10 branches, and 11% have 11 branches and above. From the above information, it is obvious that the respondents are qualified and had the

needed working experience required providing reliable information for the study. The data are therefore credible enough to present the view of the professionals in this study.

The necessity of GIS in Facilities Management

The opinion of the professional Estate Surveyors and Valuer were sought on the necessity of the use of GIS in the practice of Facilities Management and the result is presented in Table 2.

The opinion of the professional on the importance and necessity of the use of GIS in Facilities Management practices is shown in Table 2 where 77% of the respondents were of the opinion that the use of GIS in Facilities Management is necessary while the 23% of the respondents considered it not necessary.

Managing tools used in Facilities Management

The Estate Surveyors and Valuers were assessed on the usage of the managing tools in the practice of Facilities Management. Table 3 shows the adoption of the managing tools available to carry out facilities management practices by the firms of Estate Surveyors and Valuers. 63% of the firms use Computer Aided (Digital form) while 22% and 15% of the respondents use

Analog and GIS respectively. This reveals the low adoption of the technology

The importance of GIS in FM practice in Estate Surveying and Valuation Profession

The importance of GIS were considered and the Estate Surveyors and Valuers were made to state the level of their agreement to the reasons why they considered it important. Their responses are stated and ranked as shown in Table 4.

Table 4 presents data on the importance of GIS in Facilities Management practice in Estate Surveying and Valuation profession. Ranked 1st among the importance was the fact that GIS helps in cost saving and increase productivity strategies resulting from greater efficiency with mean score of 4.972, 2nd was the help of GIS in proper assets information keeping and retrieving process with mean score of 4.718, 3rd was, it enhance better decision making process with mean score of 4.014, 4th was, it assist in the expedition of space planning and analysis with mean score of 3.958, 5th was, it assist to achieving effective information sharing within and outside the firm with mean score of 3.859, and last and ranked 6th was, it improves communication among the stakeholders with mean score of 3.958.

Table 2: Opinion of the respondents on the necessity of GIS in Facilities Management practice

S/N	Option	Frequency	Percentage (%)
1	Yes	62	77
2	No	19	23
Total		81	100

Table 3: Managing tools used for Facilities Management available to the Estate Surveying and Valuation firms

S/N	Option	Frequency	Percentage (%)
1	Analog	18	22
2	Computer aided (digital form)	51	63
3	Geographic Information System (GIS)	12	15
Total		81	100

Table 4: Summary of means of the professionals' responses on the importance of GIS to FM practice

S/ N	Reasons	SA	A	N	D	SD	Total	Mean score	Rank
1	It helps in cost saving and increase productivity strategies, resulting from greater efficiency	51	20	0	8	2	81	4.972	1 st
2	It enhance better decision making process	25	25	8	13	10	81	4.014	3 rd
3	It improves communication among the stakeholders	15	10	20	26	10	81	3.338	6 th
4	It helps in proper assets information keeping and retrieving processes	39	31	0	5	6	81	4.718	2 nd
5	It assists to achieving effective information sharing within and outside the firm.	20	15	25	18	3	81	3.859	5 th
6	It assists in the expedition of space planning and analysis.	31	19	2	15	14	81	3.958	4 th

(SA= Strongly Agree, A = Agree, N = Neutral, D = Disagree, SD = Strongly Disagree)

Low adoption of GIS in FM practice

The adoption of this managing tool is low in the practice of Facilities Management by the professional Estate Surveyors and Valuers. The reasons for this were examined and presented in Table 5.

Table 5 reflects respondents' opinion on the reasons why the adoption of GIS is low and considered not necessary in the Estate Surveying and Valuation firms. The respondents with Strongly agree and Agree were grouped together while those with Disagree and Strongly Disagree were grouped together. In the first reason, the majority of the respondent (56 out of 81) which represent 69% considered that the cost of GIS software is too much while 9% were neutral. 22% of the respondents did not see the cost of the software as a problem. In the reason number two, 70% of the respondents do not have the knowledge of where to get GIS software while 1% was neutral. 29% had the knowledge of how to acquire the software. In the reason number three, 39% of the respondents considered lack of man-power to handle the software as one of the reasons for low adoption of GIS in facilities management while 19% are neutral. 43% did not see this as a problem. In the reason number four, 66% of the respondents considered the use of GIS

unnecessary as the number of facilities in their portfolio does not justify the use of GIS. 9 were neutral while 25% had enough facilities that can justify the use if GIS. In reason number five, 45% of the respondents considered the process of GIS too cumbersome while 12% were neutral. 43% considered the process very straight forward. In reason number six, 66% of the respondents preferred to continue the management of their facilities with the conventional way, they are used to while 34% of the respondents were ready for a change. In reason number seven, 41% of the respondents did not see any difference between property and facilities management; hence did not considered the use of GIS necessary. 1 was neutral while 58% of the respondents can clearly differentiate between the property and facilities management. In reason number eight, 22% of the respondents did not have any facilities to manage while 16% are neutral. 62% had some facilities to manage. In reason number nine, 74% of the respondents considered the use of GIS for Facilities Management as additional cost to the firm while 26% did not see it as additional cost. In the reason number ten, 99% of the respondents were very confident that Facilities Management is under the purview of Estate Surveying and Valuation profession while only 1% was neutral.

Table 5: Estate Surveyors and Valuers' Perceived reasons why adoption of GIS in Facilities Management is low

S/N	Reasons	SA	A	N	D	SD	Total
1	The cost of deploying GIS software is considered too much.	31 (38%)	25 (31%)	7 (9%)	5 (6%)	13 (16%)	81 (100%)
2	No knowledge of where to get GIS software	29 (35%)	28 (35%)	1 (1%)	19 (24%)	4 (5%)	81 (100%)
3	No trained personnel to manage the software	20 (25%)	11 (14%)	15 (19%)	26 (32%)	9 (11%)	81 (100%)
4	The number of Facilities in the firm's portfolio will not justify the use of GIS.	41 (50%)	13 (16%)	7 (9%)	11 (14%)	9 (11%)	81 (100%)
5	Process of GIS is considered too cumbersome	21 (26%)	15 (19%)	10 (12%)	31 (38%)	4 (5%)	81 (100%)
6	We see no reason for the use of GIS and we are okay with the conversional way of facilities management.	23 (28%)	31 (38%)	0 (0%)	20 (25%)	7 (9%)	81 (100%)
7	We consider Facilities management as same with property management.	25 (31%)	8 (10%)	0 (0%)	39 (48%)	8 (10%)	81 (100%)
8	We do not have any facility to manage	8 (10%)	10 (12%)	13 (16%)	9 (11%)	41 (51%)	81 (100%)
9	Use of GIS for Facilities management is an additional cost to the firm.	12 (15%)	9 (11%)	0 (0%)	38 (47%)	22 (27%)	81 (100%)
10	Facilities Management is not under the purview of Estate Surveyors and Valuers.	0 (0%)	0 (0%)	1 (1%)	51 (63%)	29 (36%)	81 (100%)

(SA= Strongly Agree, A = Agree, N = Neutral, D = Disagree, SD = Strongly Disagree)

Discussion and Findings

The study reveals from the respondents' view, that the use of GIS is very necessary in the practice of Facilities Management. The benefits of GIS as identified in order of importance from the study includes its influence in cost saving and increase productivity strategies; its input in proper assets information keeping and retrieving processes; its contribution to better decision making process; its role in expedition of space planning and analysis; its impact to achieving effective information sharing within and outside the firm; and its effectiveness to improving communication among the stakeholders respectively. Even with these benefits, it was revealed in the study that the adoption of GIS in facilities

Management is very low as only 15% of the firms use GIS in the management of the Facilities in their portfolio. The reasons for this were further revealed from the study. The study revealed that about 69% agreed that the cost of deploying GIS software is too much, 70% agreed that they had no knowledge of where to get the software, 76% agreed that the number of Facilities in their portfolio will not justify the use of GIS, and 55% considered the process of using GIS cumbersome.

Conclusion and Recommendation

Despite the huge advantages of GIS in facility management, its rate of adoption by the Real Estate professionals is still very low. Reasons ascribed to this are; low level

of awareness, inadequate technical manpower, huge cost of capital required, non-willingness to change from previous method used, limited properties in company's portfolio that can justify the use of the system. GIS has proved to be very effective in terms of time and cost savings. It may require a huge cost to implement but it pays off at the long run and it is available for use throughout the life of the facility management.

Nigeria Institution of Estate Surveyors and Valuers (NIESV), as the umbrella body for these professionals can encourage the use of GIS by collaborating with other professionals on how to get the GIS software and obtain adequate knowledge on the use and deploy same to her members. This will make the software cheaper and easy to acquire. The NIESV and ESVARBON should as well focus on training their members on the use of GIS. This can be achieved through the Mandatory Continuous Professional Development. Finally, the advocacy on Facilities Management as one of the functions of Estate Surveyors and Valuers is needed to boost the number of facilities management in the professionals' portfolio. This will justify the use of GIS in the Facilities Management practice.

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