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The Challenges of Geographic Information System in Urban and Regional Planning Establishments in Lagos Metropolis

Mr. Effiong, Augustine Edet Dr. Ilechukwu, Victor

Abstract
The role of GIS in the collection and standardization of geographic data, especially in map production cannot be over – emphasized. This has been recognized in developed countries but in developing countries like Nigeria, planning establishments are faced with the problem of scarce planning information. This has made planning programmes slow and difficult to execute. Therefore, the paper examines the challenges in the use of GIS as important tool for carrying out planning proposals in both public and private establishments in Lagos metropolis. A random sample opinion of 10 local planning authorities, 6 private planning firms and 3 state planning parastatal was conducted to obtain the observed views. A descriptive analysis of data collected revealed that there is high awareness of GIS in local planning authorities (82.19%), private firms (93.33%) and state planning boards (100%) but its non-application is high. This is explained by inadequate infrastructures (19.17%), lack of technical know-how (41.1%), lack of employers' interest (16.44%) and running cost (23.28).The paper recommends that the government should provide an enabling environment in areas of power supply and subsidies in the cost of GIS application to attract investors. Also, planning schools and establishments should take it as a point of commitment in training of students and staff in information technology development, especially in aspects of GIS.
Keywords: Information, Information Technology, Geographic Information System

Introduction

The eve of the 20th century is marked by the "Information revolution". It has been argued that electronic Communication will continue to play a vital role in all aspects of human endeavour (including planning) in the 21st Century and the knowledge base world of this millennium will be dominated by information technology (Ajayi, 2001). In fact, of all the many technologies of our time, progress in Information Technology (IT) has no doubt had – and continue to have – the greatest influence on the global economy, making it possible to collect, process and transmit information at breathtaking speed and declining costs, thereby increasing productivity and improving quality and efficiency in all types of industries and services (Hanna et. al 1995).

There are many aspects of information technology, namely, the radio and television, telecommunication equipment (phone, Global system of mobile telecommunication popularly known as (GSM), the Internet, the World Wide Web (www), Geographic Information System (GIS), Global Positioning System (GPS), Remote Sensing, digital photogrammetry, Automated Computer aided design (Auto cad), electronic banking (e-banking) and a host majority of others. In planning profession, most of the above aspects of information technology are relevant, especially Geographic Information System (GIS) for the purpose of this paper. Most developed countries use these new technologies in areas as diverse as education, health care, manufacturing, banking and finance, transportation, commerce, publishing, energy conservation and environmental planning and management. The question is why the inability of the use of these technologies in developing countries like Nigeria and particularly, in planning establishments in Lagos state?

GIS is an aspect of Information Technology, which has to do with acquisition, storage, processing, presentation and dissemination of spatial information for effective decision-making. It is also a computer system that synthesizes, analyzes, and displays many different types of geographic data in an understandable form. This is very relevant in planning where there is paucity of spatial information, like maps, landed documents, data analysis etc. Keeping track of all these activities is very important.

In planning profession, maps, data, population figures, and other planning related information are needed as important tools for carrying out planning proposals (Moore 1997). In developed countries, these planning tools and information are readily available for planning activities due to their high level of relevant information technology. But in developing countries like Nigeria, planning establishments, both public and private are faced with the problem of scarce planning information. Even when such information is available, they are always preserved in hard copies which make it difficult to retrieve or edit such document. As a result of this, planning programmes are always slow and difficult to execute. Therefore, the paper aims at examining the challenges in the use of GIS as important tool for carrying out planning proposals in both public and private establishments in Lagos metropolis

Theoretical and Empirical Review

Information and Communication Technology is a phenomenon that is associated with the concept of globalization. Globalization is a comprehensive term used to explain the growing economic, political, technological, and cultural linkages that connect individuals, communities, businesses, and governments around the world. (Microsoft Encarta

2007.) The most dramatic evidence of globalization is in the area of information technology, especially the Geographic Information System (GIS). The government of Canada was the first to build GIS during the 1960s to analyze data collected by Land Inventory Agency and later followed by other governments and companies. By the early 1990s, about 100,000 GIS systems were in operation (Microsoft Encarta 2007).

Geographic Information System (GIS) is a computer system that records, stores, and analyzes information about the features that make up the earth's surface (Jeffrey1990). A GIS can generate two- or three-dimensional images of an area, showing such natural features as hills and rivers with artificial features such as roads and power lines. A GIS is designed to accept geographic data from a variety of sources, including maps, satellite photographs, and printed text and statistics. The GIS converts all geographical data into a digital code, which it arranges in its database.

The applications of a GIS are vast and continue to grow. According to Grimshaw (1993), a geographical information system 'is at its simplest level a technology that enables decision-makers to explore the geographical dimension of data'. These dimensions of data include geographical/spatial data and attribute data. The representation and storage of spatial data varies between GIS and although it is usual to differentiate between raster and vector data models (Goodchild, 1991). The development of object oriented data structures suggests that such distinctions are increasingly blurred (Martin, 1996). Raster models store data as a grid of pixels, example is Tydacs SPANS system, whereas vector models use coordinate systems such as ArcInfo.

The role of GIS in the automation of routine work and time saving, especially in map production cannot be over – emphasized. Briggs & Tantrum (1997) argued that where extensive use is made of paper maps by local authorities, up to 50% of the time can be spent simply retrieving and replacing them. Also, GIS is relevant in data integration and management. For example, British Royal Commission on Historic Monuments used GIS to develop Sites and Monuments Records Management System. . In the case of the Lake District National Park Authority (LDNPA), GIS has been used to integrate accommodation data from the Cambria Tourist Board, Population Census and the Ordnance Survey to examine the ways in which different types of accommodation vary within the quieter areas and the busier central valleys of the Lake District. According to Rowley (1999), tourist accommodation data was geo-coded using postcodes in order to establish geographical location. By integrating these data with information on holiday and second homes, recorded in the census, it was possible to produce a range of thematic maps and examine the balance between tourist and residential accommodation, and the location and type of accommodation by sub-area. The integration of data from a range of sources and sectors is an important prerequisite in planning, such as tourism development. Despite technological advancement, the integration of raster- (e.g. satellite imagery) and vector-based data is not easily achievable using some lower-cost GIS. The Lake District National Park solve this problem by using two GIS — Tydacs SPANS and Map-info Professional. (Bahaire et al, 1999).

A significant proportion of a nation's economic development, social and political well being is heavily dependent upon land related activities. For examples, resource control farming, forestry, transport, tourism, fisheries and the planning of services for the community. Much of these activities can only be achieved with good, consistent land and geographic information being available and readily accessible to the private and public planning establishments as well as the community at large. Most of the examples cited are in developed countries where there is great awareness and application of GIS. Therefore, the review has shown that there is wide gap in the awareness about and use of the technology in developing countries, including Nigeria.

Research Methodology

This paper utilizes both primary and secondary sources to collect data on issues like GIS awareness by planners; the application and the use of GIS in planning establishments; some problems encountered using GIS such as availability of infrastructures, technical know – how, the interest of employees and the cost of applying this technology. A structured questionnaire was administered to 19 planning establishments using random sampling procedure, for the data collection. The planning establishments consist of 10 Local Planning Authorities, 6 private planning firms and 3 State planning parastals in Lagos metropolis. The ten local planning authorities include: Surulere, Agege, Lagos Mainland, Ibeju/Lekki, Mushin, Ikorodu, Badagry, Alimosho, Ajeromi/Ifelodun and Ikeja. The private firms were Molaj Consultants; MOA Planning Consultants; Waheed Kadiri Associates; Frontline Consultants; Masterplan Consultants and Adesanya Salako & Associates. The State planning parastatals include: Lagos State Urban Renewal Agency (LASURA), Lagos State Physical Planning and Development Authority (LASPHYDA) , and Physical Planning, Research and Statistics Department (PPRSD). The questionnaires were directed to between 5 and 10 officials each from the planning establishments. The data analysis was simple descriptive using frequency and percentages distribution.

Analysis of Findings

Descriptive analysis of data collected showed that there is high awareness of GIS in all the planning establishments, namely, local planning authorities (82.19%), State Parastatals (100%) and private firms (93.33%). However, there

is low application of this technology in local planning authorities (19%), state planning boards or parastatals (25%) and private firms (40%). Further investigation of this low application of GIS revealed lack of technical know – how [(21.78% in local planning authorities), (13.56% in private firms) and (5.75% in state planning boards)], as prominent. Other reasons given by the respondents include cost of running the technology [(12.34% in local planning authorities), (7.68% in private firms), 3.26% in state planning boards)], lack of adequate infrastructure like power supply [(10.16% in local planning authorities), (6.50% in private firms), (2.68% in state planning boards)] and lack of interest on the part of the employees [(8.71% in local planning authorities), (5.43% in private firms), 2.30% in state planning boards)].

Table 1 Response frequency and the planning establishments

Responses	LPA (n = 73)		PRF (n = 45)		SPB (n = 20)	
	No	%	No	%	No	%
Awareness of GIS	60	82.19	42	93.33	20	100.00
Lack of Awareness	13	17.81	3	6.67	0	0.00
Application of GIS	14	19.00	18	40.00	5	25.00
Non-application	59	81.00	27	60.00	15	75.00
Inadequate infrastructures	73	10.16	45	6.50	20	2.68
Lack of technical know - how	73	21.78	45	13.56	20	5.75
Lack of employer's interest	73	8.71	45	5.43	20	2.30
Inadequate running cost	73	12.34	45	7.68	20	3.26

Source: Authors' Field work (2009)

LPA = Local Planning Authority, PRF = Private Firm, SPB = State Planning Board

From the above findings, it could be deduced that there is a great awareness of GIS in both public and private planning establishments in Lagos State, but the rate at which this technology is applied varied from private to public planning firms. The application according to the findings is more intensified in the private firms than the public planning establishments. In addition, both public and private planning establishment acknowledged the fact that insufficient man power, inadequate IT infrastructures (computer and GIS software) as well as technical infrastructures like power supply are responsible for the non application of GIS.

Conclusion and Recommendations

This paper has examined the challenges facing planning establishments in the use of GIS in their operations. This has been done with respect to people's perceptions of the use of GIS in the selected planning establishments during which reasons for the observed problems were established. The use of the descriptive analysis made it possible to ascertain the level of awareness and application of GIS in the planning establishments. The paper concludes that there is a great awareness of GIS in both public and private planning establishments in Lagos State, but the rate at which this technology is applied is low, thus making it difficult to store, retrieve, edit, analyze and present maps and other planning documents. This is attributed to inadequate manpower to use the IT infrastructures, insufficient power supply, poor capital base and lukewarm attitude of the employers to GIS application.

The paper recommends that the government should provide an enabling environment in areas of power supply and subsidies in the cost of GIS application to attract investors. Also, planning schools and establishments should take it as a point of commitment in training of students and staff in information technology development, especially those aspects that are relevant in planning like GIS, GPS, aerial photogrammetry, auto cad etc. Thus it is suggested that all planning Schools in the country should make GIS and other related IT packages a core and compulsory course in their academic curriculum. Planning establishments, both public and private should organize trainings, workshops and seminars on GIS and other Information Technology related packages for their staff so as to keep them updated and make them relevant in the contemporary society.

These recommendations will enable planning establishment to organize resources-based information into one seamless environment, perform daily work more efficiently (e.g. updating record plans, or keeping records of maintenance activities and customer complaints), better analyze problems and identify solutions (e.g. mapping and identifying water mains in terms of location, pressure, pipe size, materials or construction date), serve as data bank in the collection and standardization of geographic data used by numerous departments, satisfy regulatory requirements that are increasingly reliant on computer-generated data and maps (e.g. development of water shed protection plans or traffic management reports) and better serve the needs of the citizens.

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