

Paper Presented at Second Annual National Conference of the School of Science,  
Federal Polytechnic Ilaro, Ogun state held between 7th -8th May,2013

---

## **APPLICATION OF GEOGRAPHIC INFORMATION SYSTEM TO ENHANCING SECURITY IN NIGERIAN URBAN CENTERS.**

BY

<sup>1</sup>Akinode Lekan, <sup>2</sup>Tpl Olapeju Olasunkanmi

<sup>1</sup> Department of Computer Science, Federal Polytechnic Ilaro

<sup>2</sup> Department of Urban and Regional Planning, Federal Polytechnic Ilaro

Paper Presented at Second Annual National Conference of the School of Science,  
Federal Polytechnic Ilaro, Ogun state

Date 7<sup>th</sup> -8<sup>th</sup> May,2013

*Abstract*

*This paper attempts to locate security within the enclave of the transformation agenda of President Good luck Jonathan. It empirically presented Nigeria's present challenge of insecurity, and identified the weak state of our security apparatus as being among other proximate and remote factors of insecurity in Nigeria. Specific areas where GIS is applicable to internal security were harped upon. The paper recommends, inter alia, that there is need for GIS departments to be established by the Federal Government in all police stations in Nigeria to provide spatial analysis for intelligence generation and security planning.*

*Keywords: Transformation Agenda, insecurity, Geographic Information System*

## **INTRODUCTION**

The transformation agenda of the Federal Government of Nigeria draws its inspiration from vision 20:2020 and the first National Implementation Plan (NIP). The agenda is based on a set of priority policies and programmes, which when implemented would transform Nigeria to meet the future needs of the people (Leon, 2011). The transformation agenda is a 5year development plan (2011-2015), focused on key areas which include; macro-economic framework and economic direction; job creation; public expenditure management ; governance; justice and judiciary, foreign policy and economic diplomacy; legislature; Education ; Health sector ; labour and productivity; Infrastructure policies programmes, and projects ; power; information and communicate technology; Niger delta and transportation(Gyong, 2012).

As captured by Leon (2011), the relevance of security to the transformation agenda is well expressed in the agenda's policies on governance, which is motivated by Nigeria's inability to decisively tackle most development challenges like poverty, unemployment, and insecurity. In the wake of the unprecedented challenges of insecurity besetting Nigeria as expressed in heightened rate of terrorism, abduction, and armed robbery, the need to vigorously focus on security in the thrust of the transformation agenda cannot be over emphasized. This is because the level of success or improvement in other aspects of the transformation agenda is empirically linked with the state of internal security. Perhaps, this explains why the leadership of the country now specifically unclad security from the covering of policy thrust on governance under which it is subsumed, and rather presents it ,as a matter of expediency, an independent issue , among others that the transformation agenda is all about.

The aim of this paper is to present a synthesis of existing knowledge of Nigerian urban centers' state of insecurity, with the view of exploring areas where Geographic Information System can

be applied in enhancing the performance of agencies saddled with the onus of grappling with the menace.

## **SECURITY CHALLENGES IN NIGERIA**

Security as defined by Achumba et al, (2013) is the stability and continuity of livelihood, predictability of daily life ,protection from crime , and freedom from physiological harm. As expressed in Igbuzor (2011), it demands safety from threats and protection from harmful disruption. It is generally advanced that security is not the absence of threats or security issues, but the ability to rise to the challenges posed by these threats with expediency and expertise (Achumba et al, 2013). Insecurity on the other hand, is the antithesis of security. As captured in Andrew and Kenny (2003), the causes of insecurity in Nigeria are divided into remote (root) factors and immediate and proximate factors. The remote factors are expressed as lack of institutional capacity resulting in government failure; pervasive material inequalities and unfairness; ethno- religious conflict; conflict of perception between the public and the government; weak security system; and loss of socio-cultural communal value system. The immediate and proximate factors are porous border; rural /urban drift; social irresponsibility of companies; unemployment /poverty; and terrorism.

In Nigerian urban centres,the variables of insecurity range from theft to organized armed robbery ,kidnapping and demand of ransom, assassination , repeated invasion, social injustice , unemployment , lack of access to livelihood resources , rising cost of living and bombing.

**TABLE 1: Level of crime in Nigeria from 2000-2008**

Year	Theft	Armed Robbery	Kidnapping	Assassination	Fruad
2000	29127	1877	245	1255	7927
2001	40796	2809	349	2120	10234
2002	35321	3889	337	2117	9154

2003	33124	3497	410	2136	9508
2004	37289	3142	349	2550	9532
2005	46111	2074	798	2074	9580
2006	41901	2863	372	2000	6395
2007	21082	2327	277	2007	5860
2008	23929	2340	309	1956	5058

Adapted from Achumba et al, (2013)

Table 1 shows the level of crime in Nigeria from 2000-2008. However, as captured in Achumba et al, (2013), CLEEN(2012) in a survey of crime rate in Nigeria found that armed robbery, abduction, and incident of vandalization of telecommunication infrastructure had increased significantly in the past one year. Moreover, as well documented in Maya (2012) Boko Haram, since its founding in 2001, had been responsible for over 100 major attacks and had caused the death of between 3,000 to 10,000 people, including women and children. The implication of the foregoing for the Nigeria business environment is portentous and threatens the sustainability of achievable gains in other aspects the transformation agenda.

While the authors of this paper submit that the mitigation of Nigeria security challenges should take a holistic gamut of political reforms, systemic improvements in job creation and arrest of the problem of regional imbalance, the need to address the weak state of our security apparatus can also not be wished away. This is essentially the rationale behind this paper's attempt at exploring ways with which Geographic Information System (GIS) can be adopted as an intelligence application to enhance the operations of our security systems in their mandate to arresting urban crime.

### **WHAT IS GEOGRAPHIC INFORMATION SYSTEM (GIS)**

The GIS is a powerful set of tools for collecting, sharing, retrieving, transforming, and displaying spatial data from the real world for particular set of purpose (Uchegbu, 2002). . It is an information system based on geographically georeferenced data. GIS is important today because it is able to bring together information from multiple sources so that various types of work can be done. In

order to do this, the data must be tied to a specific location on the Earth's surface. Latitude and longitude are usually used for this and the locations to be viewed are attached to their points on the geographic grid. The basic data type in a GIS reflects traditional data found on a map (Amanda, 2008). Accordingly, GIS technology utilizes two basic types of data. These are spatial and attribute data. Spatial data describes the absolute and relative location of geographic features. Attribute data describes characteristics of the spatial features. These characteristics can be quantitative or qualitative in nature. Attribute data is often referred to as tabular data.

The coordinate locations of police posts would be spatial data, while the characteristics of that police post, e.g. radius of service, carrying capacity, population of service areas, etc., would be attribute data. Other data types, in particular image and multimedia data, are becoming more prevalent with changing technology. Depending on the specific content of the data, *image data* may be considered either spatial, e.g. photographs, animation, movies, etc., or attribute, e.g. sound, descriptions, narration's, etc (David ,2010).

Also important to the functionality of GIS is the use of rasters and vectors. A raster is any type of digital image, such as an aerial photograph. The data itself however is depicted as rows and columns of cells with each cell having a single value. This data is then transferred into GIS for use in making maps and other projects. A common type of raster data in GIS is called the Digital Elevation Model (DEM) and is simply a digital representation of topography or terrain.

A vector is the most common way data is shown in GIS. Vectors are referred to as shapefiles and are made up of points, lines, and polygons. In GIS, a point is the location of a feature on the geographic grid, such as a fire hydrant. A line is used to show linear features like a road or river and a polygon is a two dimensional feature that shows an area on the earth's surface such as the property boundaries around a university. Of the three, the points show the least amount of information and the polygons the most.

In addition, GIS is capable of translating a raster to a vector in order to make analysis and data processing easier. It does this by creating lines along the raster cells that have the same classification to create the vector system of points, lines, and polygons which make up the features shown on the map

In GIS, there are three different ways in which data can be viewed. The first is the database view. This consists of the geodatabase otherwise known as the data storage structure for ArcGIS. In it, data is stored in tables, is easily accessed, and is able to be managed and manipulated to fit the terms of whatever work is being completed. The second view is the map view and is the most familiar to many people because it is essentially what many see in terms of GIS products. GIS is in fact a set of maps that show features and their relationships on the earth's surface and these relationships show up most clearly in the map view. The final GIS view is the model view which consists of tools that are able to draw new geographic information from existing datasets. These functions then combine the data and create a model that can provide answers for projects (Amanda, 2008).

## **APPLICATION OF GEOGRAPHIC INFORMATION SYSTEM IN SECURITY MANAGEMENT.**

GIS has application ranging from urban planning; military engineering; health and hygiene; command and control; defense mapping organization; base operation and facility management; intelligence surveillance, and reconnaissance systems; mine clearing and mapping; terrain analysis; and visualization(ESRI, 2003).

The use of GIS tools and satellite imagery has been demonstrated as pivotal in planning and coordinating security operations. GIS can be used to map and analyze crime occurrence with a view to determining factors leading to such crime.

Adeniran et al (2013), in its work on the application of GIS in internal security operations in Jos, which relied on database design, collection of geometrics and attribute database creation, successfully showed the areas that were more prone to violence in their study area. The best route analysis of various facilities, including church and mosques from a military post within the

urban center was also made possible via a simple query on GIS. This is to help the military respond and plan on time to reach crime incident areas.

Service areas analysis for mapped police posts can also be achieved through GIS, as this will help determine the number of potentially crime targeted facilities that are within the radius coverage of the police post in order to help the security agencies respond, plan and manage security operations effectively. With simple queries on the GIS, as evident in the work of Fajemirokun et al, (2006), crime location or zones can be more specifically geo-referentially determined, as soon as police gets informed of a crime incident.

In summary, A GIS involves the following elements in using the spatial and attribute data for security enhancement.

- (1) Input(encoding)(Collection of phone listings, census information by geographic area-block groups or tracks, uses of building, location of police post, street names, and spatial history of crime and other variables of insecurity in the area under consideration
- (2) Data management(Storage & Retrieval) and analysis(GIS Systems such as Arc View, Map info, Geo Media, LandView/Marplot)
- (3) Output(Maps showing insecurity risk zones, vulnerable population, phone listings in vulnerable areas ,maps showing crime vulnerable area, service radius of police stations, most optimal routes to crime spots.

## **CONCLUSION AND RECOMMENDATION**

This paper has established security as a key component of the transformation agenda. It has empirically presented Nigeria's present challenge of insecurity, and equally concisely highlighted the specific areas where GIS is applicable to internal security, as modern security operations involve an integrated approach for evaluating conflict areas for mobilizing logistics, moving various forces, and setting communication network for effective security operations in real time scenarios.

It is however recommended that GIS departments should be established by the Federal Government in all police stations to provide spatial analysis for intelligence generation and security planning. The adoption of GIS by the Nigerian Police should be in collaboration with other forms of security management systems. Capacity of security personnel should be built in the application of GIS to their functions, while adequate professionals with relevant credentials in GIS technology should be employed in Nigeria's security outfits.

## REFERENCES

Achumba, O. S.; Ighomereho, M. O. and Akpor-Robaro F. (2013) Security Challenges in Nigeria and the Implications for Business Activities and Sustainable Development. *Journal of Economics and Sustainable Development*. Vol 4(2)

Adeniran, Ekpo Effiong, Adedayo O. Alagbe And Ibekwe,V.J, (2013). *Application of Geographic Information System (GIS) In Internal Security Operations, a Case Study Of Jos Metropolis, Plateau State*. Nigeria FIG Working Week 2013 Environment for Sustainability Abuja, Nigeria, 6 – 10 May 2013

Amanda B.(2008) : GIS: An Overview An Overview of Geographic Information Systems. <http://geography.about.com/od/geographyintern/a/gisoverview.htm>. Retrieved 30<sup>th</sup> April 2013

Andrew, C. and Kennedy, M. (2003). *Root Causes of Human Insecurity in A New Security Paradigm: The Cambridge Security Seminar*, University of Cambridge, UK.

CLEEN Foundation ( 2012). *Summary of Findings of 2012 National Crime and Safety*

*Survey*.E:/summary-of-findings-of-2012-national.html. Retrieved 30<sup>th</sup> April 2013

David ,J.B. (2010) *Introduction to GIS*.[http://bgis.sanbi.org/gis-primer/page\\_14.htm](http://bgis.sanbi.org/gis-primer/page_14.htm). Retrieved 30<sup>th</sup> April 2013

Economic and Social Research Institute (2003) *GIS for Defense and Intelligence*.<http://www.esri.com/library/brochures/pdfs/gis-for-defense.pdf>. Retrieved 3<sup>rd</sup> May,2013.

FAJEMIROKUN, O. A.; Timothy I.; Abimbola O.and Babajide M (2006). *A GIS Approach to Crime Mapping and Management in Nigeria: A Case Study of Victoria Island Lagos Shaping the Change*. XXIII FIG Congress Munich, Germany, October 8 – 13, 2006

Gyong, J.E. (2012) A Social Analysis Of The Transformation Agenda Of President Goodluck Ebele Jonathan .*European Scientific Journal July edition Vol.8(16)*

Igbuzor, O. (2011). Peace and Security Education: A Critical Factor for Sustainable Peace and National Development. *International Journal of Peace and Development Studies* Vol. 2(1), 1-7

John,C.P(2008). *Geographic Information Systems in Emergency Management*. [http://lagic.lsu.edu/LGISC/GIS\\_Primer/gisapptools.pdf](http://lagic.lsu.edu/LGISC/GIS_Primer/gisapptools.pdf). Retrieved 3<sup>rd</sup> May,2013

Leon,U. (2011) *ABC of Jonathan's Transformation Agenda* <http://www.tribune.com.ng/news2013/index.php/en/>. Retrieved 3<sup>rd</sup> May,2013.

Paper Presented at Second Annual National Conference of the School of Science,  
Federal Polytechnic Ilaro, Ogun state held between 7th -8th May,2013

---

Maya,S,(2012) *Nigeria Starts Backchannel Talks with Boko Haram Insurgents*.[http://www.ibtimes.com/stirrings\\_hope-nigeria-starts-back-channel-talks-bokoharam-insurgents-9599167](http://www.ibtimes.com/stirrings_hope-nigeria-starts-back-channel-talks-bokoharam-insurgents-9599167). Retrieved 3<sup>rd</sup> May, 2013.

Uchegbu,S.M.(2002) *Issues and Strategies in Environmental Planning and Management in Nigeria*. Enugu,Spotlite Publishers.