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# THE USE OF GEOGRAPHIC INFORMATION SYSTEMS FOR DISPLAY OF UNIVERSITY OF CALABAR USE STATISTICS AND FUNCTIONAL AREAS.

BY

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## ABSTRACT.

*The purpose of this study is to present University of Calabar statistics and functional areas using Geographic Information Systems (GIS). The process of using a GIS is faceted and involves different methods of presentation. Being that University of Calabar Library has not yet been geo-mapped, author traced in-use statistics in the different divisions for a 3-years period especially to show that the library, in whatever format is useful for Information services. The summed in – use statistics gave a total data for study in all the functional areas. Analysis was presented using three different types of GIS charts----- Lines with markers charts, Radar charts, and a 3-D 100% stacked column chart. The findings revealed that library use data can be represented using a GIS. In addition, when data is accurate, whatever GIS design used for presentation and visualization will be accurate, most times self-explanatory and easy to understand. There is little published research to date on the capabilities and applications of GIS in this area of the world. This research provides a practical application-base overview. The paper therefore recommends that library Management in collaboration with the parent institution should arrange for the training of librarians in GIS usage. This would be important to boost contemporary Librarianship in this aspect.*

**Keywords:** Information, GIS, In-use statistics, Functional areas, GIS-charts, University of Calabar Library.

## INTRODUCTION

The train of modern librarianship is moving rapidly through libraries as recently, all types of libraries have become active users and providers of Geographical Information Systems (GIS) resources. Larsgaard and Alder (n.d.) advanced the following reasons for this trend to include first, the utilization of new technologies such as GIS in support of Education, research, and effective access to information resources. Second, collecting, maintaining, preserving, and providing access to spatial resources which is not new to libraries, but the advent of GIS has resulted in libraries exploring new approaches to many, if not all, of these ‘traditional’ library

functions. Third, the rapid expansion and utilization of networked services, particularly within the academic sector, as communication and educational tools present new opportunities for libraries to address the information needs of a diverse clientele. These changes are occurring at the same time as libraries are in a state of transition, experimentation, and transformation.

To serve a varied clientele, libraries work with a myriad of information technologies and information resources in multiple formats. Indeed, libraries are constantly challenged with the introduction of new technologies, services, and formats (Lyman 1996). They also have to design training programmes that will assist in the effective integration of new programmes and services. Thus the growing array of geospatial information products and services, particularly within the governmental and academic sectors, requires that libraries engage in GIS activities to provide effective access to these digital resources.

Drawing us back a little is the fact, that University of Calabar was established by the Federal Military Government in 1975 to respond to the rising expectations of Nigerians in the field of higher education. It is the Parent Institution under which University of Calabar Library exist and operate as an academic library. Like all other academic libraries the world over, it has some very important roles to play which stem from procurement of relevant books/journals and other information resources for teaching, learning and research activities in the institution (Uchendu & Esin, 2008).

The University Library which edifice started solely as a traditional system has grown with time to embrace the trends in contemporary librarianship which incorporates the adoption and utilization of Information and Communication Technologies (ICTs). Lawal & Ani (2008) revealed that the University library has embarked upon two out of the three approaches of developing virtual library. These include; library computerization and subscription to online

databases. The remainder has to do with digitization of library resources which require many funds at a time when it is no longer news that skeletal funding processes militate against proper rendering of library services in the information age.

An earlier study by Ani, Esin &Edem (2005) had revealed University of Calabar library among other three libraries as having started providing internet services out of 17 responding libraries in the country. This has encouraged librarians, researchers and academics to improve the quality of their tasks and services; share their resources as well as collaborate with other researchers with greater access to relevant information at any point in time. However, University of Calabar library has also joined in witnessing a paradigm shift and transformation in line with global trends and emerging electronic information environment. This has helped to fulfill a long desire and dream for access to information anywhere and anytime as users can now have access to relevant information without visiting the physical library within and outside the country.

Today as a further development in the ICTs trends, the authors present another innovation: the display of the functional areas of the University of Calabar using Geographical Information Systems.

### **PURPOSE OF THE STUDY**

It is a fundamental assumption pertaining to the fact that the library world is changing always by a combination of natural and man-made modifications. In order to understand what is going on in our world, we study the processes / phenomenon that bring about geographical changes. At other times, we broaden or deepen our understanding to help for decision-making. Mandel (2010) revealed that modern libraries operate in a context of limited funding where the librarians must justify the continued value of the library to funding and supervisory authorities especially with

the case of patrons increasingly accessing library virtually; leaving doubts as to whether there's still relevance in the physical library.

This had given rise to many users' studies as the library facility is constantly being observed, measured and evaluated to identify high areas of usage, possible areas relevant to library marketing as well as showcase such structures that must be present on ground before any marketing can be done (Lawal, 2015). Hence, the purpose of this study is to present the functional areas of University library using GIS on statistics generation for users' services.

## **LITERATURE REVIEW**

**The Concept of GIS:** The concept of GIS is vast and encompassing thus allowing researchers to give different definitions to suit the direction of its usage. Donnelly (2009) held that some definitions are narrow while some are broad to give appropriate insight into the actual meaning. GIS is narrowly defined as an integrated collection of software and data that is used to visualize and organize place-based data for the purpose of performing analyses and creating maps (Wade & Sommer, 2006, p.90). In a broader sense, the definition incorporates the GIS community, the group of people who create and share the data, and the activity of using GIS for problem solving and knowledge creation (Longley, 2008).

Huisman & deBY (2009) defined GIS as a computer –based system that provides the following four sets of capabilities to handle geo-referenced data:

- Data capture and preparation
- Data management, including storage and maintenance
- Data manipulation and analysis
- Data presentation (mapping).

It can be applied to all professions with positioned data that relates to geographical space and addresses where things are or perhaps where they were or will be. GIS is more precisely concerned with professions having positional data relative to the earth's surface only because there are still some positional data with a non-geographical relationship. For example, the location of appendix in the human body or car headlights. GIS is a tool for working with geographical information to show relationships of effect on geographical situations and can be used to identify high-risk areas of annual floods by investigating rainfall patterns and terrain characteristics.

**Uses of Geographic Information Systems:** GISs play an important role in many organizations. For instance, police and fire departments may use GISs to locate landmarks and hazards, plot destinations, and design emergency routes. GISs may also be used by governments, research institutes or any other body that cannot possibly handle the task of manually processing large amounts of geographical data. Mandel (2010) explained that rather than using tables and charts to display library use data, a GIS facilitates a more visually appealing graphical display of the data in the form of a map. GIS have been used by library practitioners and researchers to create maps that display analysis of service area, population and demographics, facilities space management issues, spatial distribution of in-library use of materials as well as planned branch consolidation.

Larsgaard & Alder (n.d) argue that the range of issues identified and addressed during users' inquiry is not unique to GIS and they vary depending upon the user, the inquiry and the Institutional commitment but presents efforts relating to cataloguing of spatial data by the library community as the exploration of new approaches to working with spatial resources. Authors further revealed that libraries, given their role as a neutral voice in a community, academic

enterprise or related institutions serve in a unique capacity of information dissemination and provide access devoid of duplication of efforts regarding digital resources for users of all levels. Thus, in many capacities, GIS presents libraries with opportunities to bridge the traditional functions as these institutions embrace digital and networked technologies.

Donnelly (2009) reiterates that the use and support of GIS in libraries has grown significantly over the past fifteen years and a number of studies have documented the growing trends of libraries offering GIS services. Gabaldon & Replinger (2006) noted that Geographical Information Systems began to appear in United States libraries in the 1980s with the Introduction of Desktop GIS software and grew with the distribution of the census Bureau's TIGER line files with the 1990 census while Morris (2006) added that the role of libraries in providing GIS services also grew to include ; data collection , data recovery tools and support, technical support, workshops and training, marketing and outreach, technical approaches to delivering geographic data and web mapping.

A 2005 American Research Libraries survey of its members found that 31 out of 57 respondents agreed to have offered support for GIS and remote sensing data and services (Salem & ARL, 2005). Another survey by Gabaldon & Replinger (2006) on member institutions of the Alliance Science List of Public and Private institutions in the US Northwest and the Oberlin group of private liberal arts schools throughout the USA found that 31 had implemented GIS services, 15 were considering adopting services and 57 had no plans of doing so. The study found that public universities, schools with large budgets and schools that offered PhD or Master's Degree were more likely to offer GIS services. Again, Michalec & Welsh (2007) studied a number of GIS related articles published in journals included in the two major library

and information science (LIS) databases found that 146 GIS articles were published in 69 different LIS publications between 1990 and 2005, and that the trend in number of articles was increasing.

The progress on GIS usage has not only increased the number of software (proprietary as well as the free and open source (FOSS) compatible for whatever needs to be done .Donnelly (2009) revealed that each individual FOSS GIS package had their own peculiar strengths and weaknesses and some performed well for thematic mapping.

### **GIS Challenges in Libraries**

GIS in libraries lack discussion because some consultation projects are not published since they lack rigorous methodology. Clients do not wish to publicize findings of private purpose and competitive advantage. Most times maps are seen as results of analysis/ end products of little discussion of methods to assist future projects or duplicate studies. There is difficulty in explaining cartographic and geographic principles to non-GIS expert readers. The visualization data presented GIS needs to be described for non-GIS experts otherwise, they may not understand.

### **Description of Functional Areas.**

**Functional Areas of University Calabar Library:** The University Library functional areas are in line with the general features of an academic library. It is divided in to seven main divisions with units beside the Administration. They include; Resource Development Division and Serials unit, Processing Division and Catalogue maintenance unit, Readers' Services Division and its many units(Humanities, Social Sciences, Law Reference, Medical Library and Science and



Technology Library), Reference /Bibliographic Services Division with First Degree Projects and World Bank Depository units, Research Library Division housing Journals, Abstracts and Indexing units, Africana/ Government publication Division and newspaper collection unit as well as System Development/ICT Division and Bindery unit. Each division is made up of professionals, Para-professionals and non-professional staff, performing one duty or another under the leadership and supervision of the Head of Division. As in every chain of command in organizations, Heads of Divisions take instructions from the University Librarian and the Deputy University Librarian because the University Librarian's office is responsible for all the administrative functions in terms of leadership and general supervision. Although each division is responsible for specific duties and staff members work together to achieve the divisional objectives, all divisions work coherently for the general achievement of the library goals.

#### **Divisions and their specific functions:**

- 1 **Resource Development Division /Serial Unit:** This division is popularly called the Acquisitions Division hence, responsible for all acquisitions of materials whether book or non-book regardless of whether they are brought in through direct purchase, donation, exchange and or legal deposits. The role of selecting, ordering, accessioning, and stamping are performed here and no two items can have the same accession number in the stock. Other duties include keeping records of all materials ordered and received into the library thus the Library has to-date, a total of 159689 books and 16726 serials and 9166 bound journals respectively.
- 2 **Processing Division/Catalogue Maintenance Unit:** The general procedure that keeps the materials in a form usable to the public is carried out in this division.

- Professionally, it is called Cataloguing and Classification leading to cataloguing of materials, typing of catalogue cards, preparation of book pockets, date due slips and spine labels which make the materials ready to be sent to relevant sections for utilization since the division is out of bounds to users as the library engine room.
- 3 **Reader Services Division and its many units:** This division takes charge of registering users so they can be eligible to borrow books for home use after such had been processed and forwarded to the division. It is well organized to cover all fields of knowledge in the following five units; **Humanities Library** housing materials in arts and related fields like philosophy, psychology, religion, history, English and linguistics, theater arts, French and literature. **Social Science Library** with materials in economics, accounting, banking/finance, marketing, statistics, political science, sociology, education, geography, oceanography, ecology, and anthropology. **Law Reference Library** housing all law materials meant for pure reference work as they cannot be borrowed for home use. **Medical Library** displaying all medical materials and related fields such as physiology and microbiology. **Science and Technology Library** containing materials on science and related fields like physics, chemistry, biological sciences, mathematics, geology, computer science, agriculture, technology, and military science.
- 4 **Reference/ Bibliographic Services Division:** All core reference materials such as encyclopedias, dictionaries, directories, atlases, and maps which users may seek for specific information like definitions, formulas, addresses, background information about persons, places and subjects are housed here. The materials cannot be loaned out for home use but can be allowed for photocopying purpose. The general catalogue cabinets

are kept here to assist users have access and locate needed relevant information in any division of the library. Other units of this division include the first degree projects, current newspapers /magazines and the World Bank depository materials. The Librarians in this division can seek assistance from other libraries to satisfy a user's need if what is required is not within the library.

- 5      **Research Division:** This division has two main units –Abstracts and Indexes as well as the Journals unit. It takes charge of research materials like journals, magazines, newsletters, abstracts/Indexes to assist scholars, academics, and researchers within and outside the university environment.
- 6      **Africana /Government Publication Division:** Post graduate theses/dissertations and books about Africa, written by Africans are kept here. Beside, all Government (federal, state and local) publications and their agencies are kept here. Materials here are in closed access. This means that users do not just walk to the shelve to take what they want but can use materials from this division after checking up the information needed from the catalogue and then presenting same to the library staff who locates such for them.
- 7      **System Development Division:** Incorporates the bindery and printing unit while taking charge of the computerization of the library as well as the provision of internet services to library clientele.

**Library Statistics, Data can make a Difference:** Statistical data are indispensable and necessary for the internal management of libraries but they can do more by promoting library services to the different stakeholders, actual and potential users, the media and the general

public. When presented to policy makers, funding institutions or the general public, they will influence strategic planning, create and maintain confidence in libraries as well as help to make decisions on levels of services. Library statistics can reveal a wealth of materials, of hidden success stories where libraries have opened and ensured access to relevant information for all groups of the population.

Byrne (2005) noted that libraries and information services serve society by providing memory, feeding development, enabling education and research and support international understanding and community well-being. Quantitative and qualitative data about library services, library use and users are essential for revealing and confirming the outstanding value that libraries provides. As the informative value of such statistics depends on their comprehensiveness and speed, the participation of all libraries section will be necessary.

**What Library Statistics show:** Measurement of input into libraries (resources including buildings and equipment, staff and collection), show the engagement of politics and authorities for library services. By counting the output, the usage of traditional and new electronic library collections and services, libraries show that their services are adequate to the respective population. Comparing input and output data demonstrates whether libraries are organizing their services in a cost effective way.

Data about the use and acceptance of library services can also indicate the outcome of libraries on the population. Such outcome (on literacy, information seeking skills, educational success or social inclusion) will be more visible where qualitative data from users' survey are added to statistical results as libraries have assumed new responsibilities in a changing information world, and need new statistics for managing and promoting these new tasks.

**Quality of Library Statistics:** Correct, reliable and comparable data are crucial for the value and usefulness of library statistics. The quality of national and finally from the international-library statistics depends on accurate and timely delivery by each library and on careful editing to detect errors and misunderstandings. Hence, to take results from comparable between regions or countries, the same definitions and methods must be used.

Again, libraries are not under the same authority. Most of them serve specified institutions (universities, commercial firms or communities). Other institutions may be responsible for the mission, functioning or legal regulations in their domain. Therefore, various institutions and organizations with differing objectives may feel responsible for collecting data about their libraries within their authority. The collection of library data will always start in an individual library even if the aim should be compilation of regional and national level data. For this purpose, libraries should collaborate to form regional/national networks for library statistics in order to ensure that a national library system is running effectively.

**Attrition Table: *Presentation of library statistics in major library Divisions of University of Calabar.***

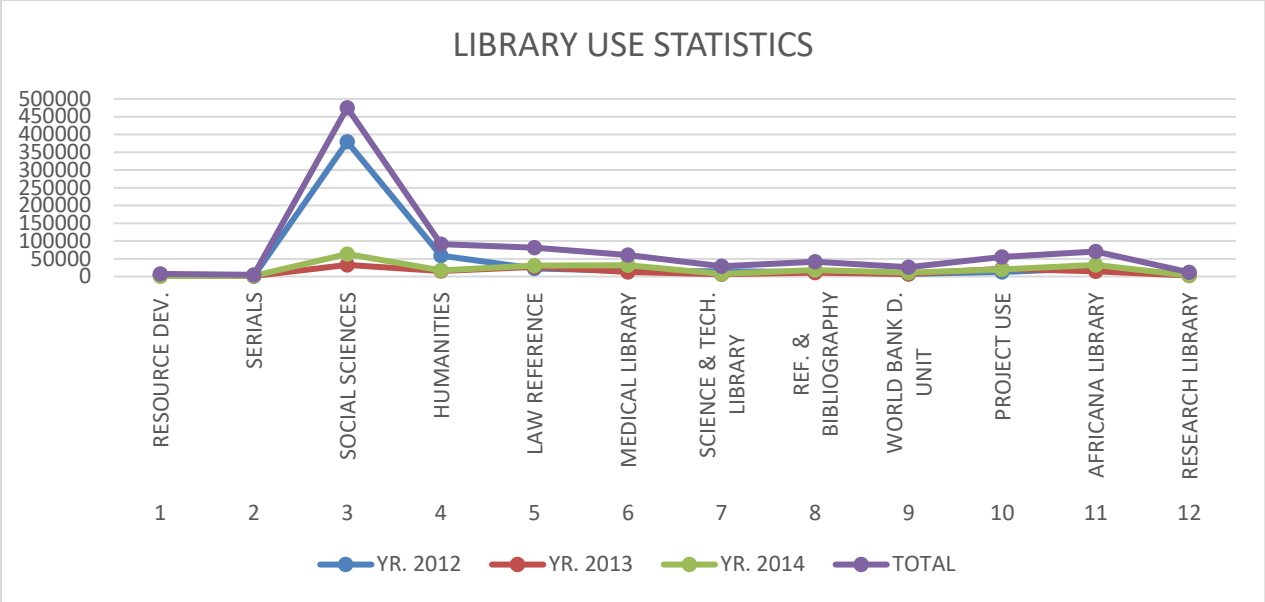
<b>UNICAL LIBRARY IN- USE STATISTICS</b>		<b>YEAR</b>			
<b>S/N</b>	<b>LIBRARY DIVISIONS</b>	<b>YR. 2012</b>	<b>YR. 2013</b>	<b>YR. 2014</b>	<b>TOTAL</b>
<b>1</b>	<b>RESOURCE DEV.</b>	<b>3968</b>	<b>2015</b>	<b>1264</b>	<b>7247</b>
<b>2</b>	<b>SERIALS</b>	<b>1340</b>	<b>1565</b>	<b>2019</b>	<b>4924</b>
	<b>PROCESSING DIVISION</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>126119</b>
<b>3</b>	<b>SOCIAL SCIENCES</b>	<b>379161</b>	<b>32683</b>	<b>63408</b>	<b>475252</b>
<b>4</b>	<b>HUMANITIES</b>	<b>58409</b>	<b>15343</b>	<b>17163</b>	<b>90915</b>
<b>5</b>	<b>LAW REFERENCE</b>	<b>22687</b>	<b>27516</b>	<b>30661</b>	<b>80864</b>
<b>6</b>	<b>MEDICAL LIBRARY</b>	<b>16588</b>	<b>12739</b>	<b>31340</b>	<b>60667</b>
<b>7</b>	<b>SCIENCE &amp; TECH. LIBRARY</b>	<b>14837</b>	<b>6750</b>	<b>7509</b>	<b>29096</b>
<b>8</b>	<b>REF. &amp; BIBLIOGRAPHY</b>	<b>12345</b>	<b>11217</b>	<b>18413</b>	<b>41975</b>

<b>9</b>	<b>WORLD BANK D. UNIT</b>	<b>7503</b>	<b>7560</b>	<b>11312</b>	<b>26375</b>
<b>10</b>	<b>PROJECT USE</b>	<b>13156</b>	<b>22175</b>	<b>19899</b>	<b>55230</b>
<b>11</b>	<b>AFRICANA LIBRARY</b>	<b>23600</b>	<b>14516</b>	<b>32171</b>	<b>70287</b>
<b>12</b>	<b>RESEARCH LIBRARY</b>	<b>5946</b>	<b>3256</b>	<b>2708</b>	<b>11910</b>
<b>13</b>	<b>SYSTEMS DEVELOPMENT</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>

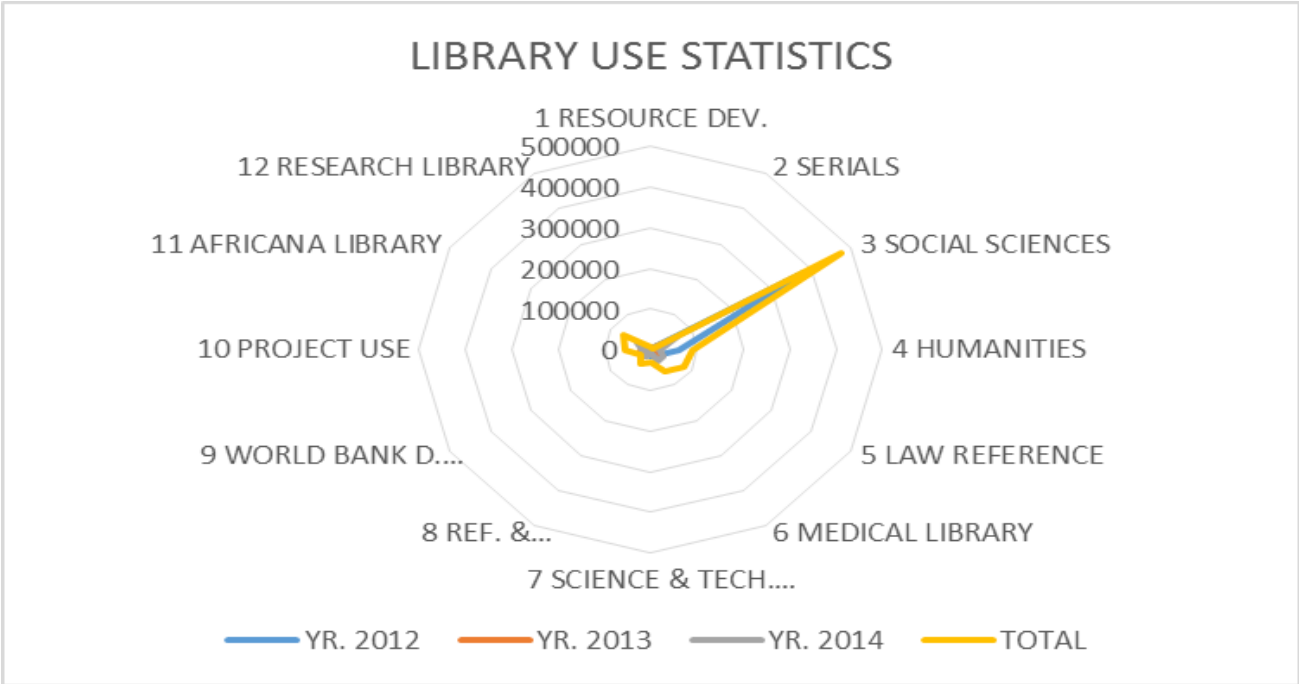
It could be observed from the table that an acquisition of 7247 textbooks and 4924 volumes of serials were added to the stock to aid usage giving a total of 126119 processed materials for the period under research while serial numbers 3-13 indicate actual use statistics in the different divisions. These acquired and processed materials were added because they could also have been used by clients in the functional areas. The in-use statistics showed a general increase in year 2012, a gross decline in 2013 and a stepping up in 2014 except for project use and research library.

### **Presentation & Analysis of Library statistics using GIS charts**

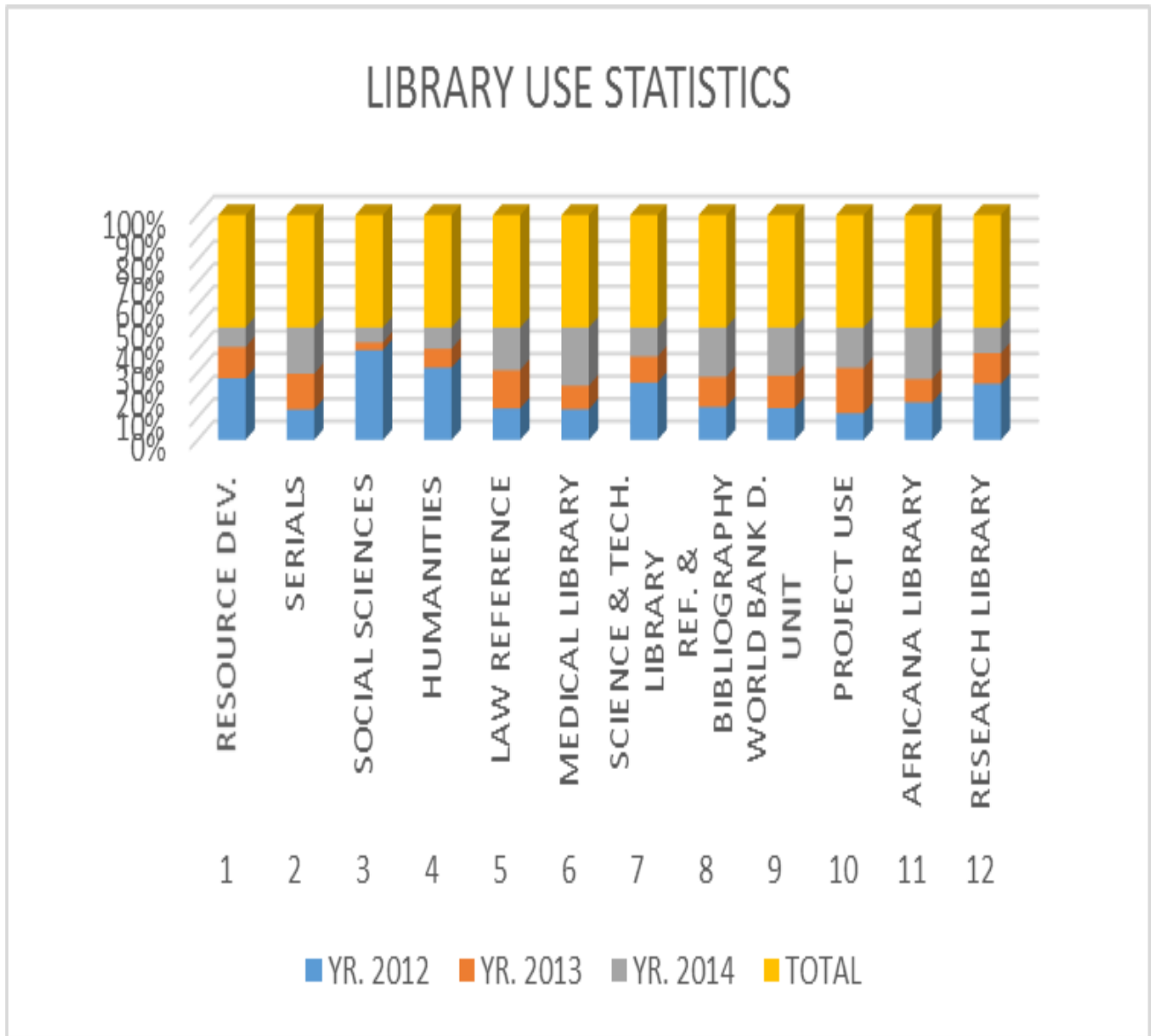
#### **(a) Lines With Markers Chart.**



**(b) Radar Chart**

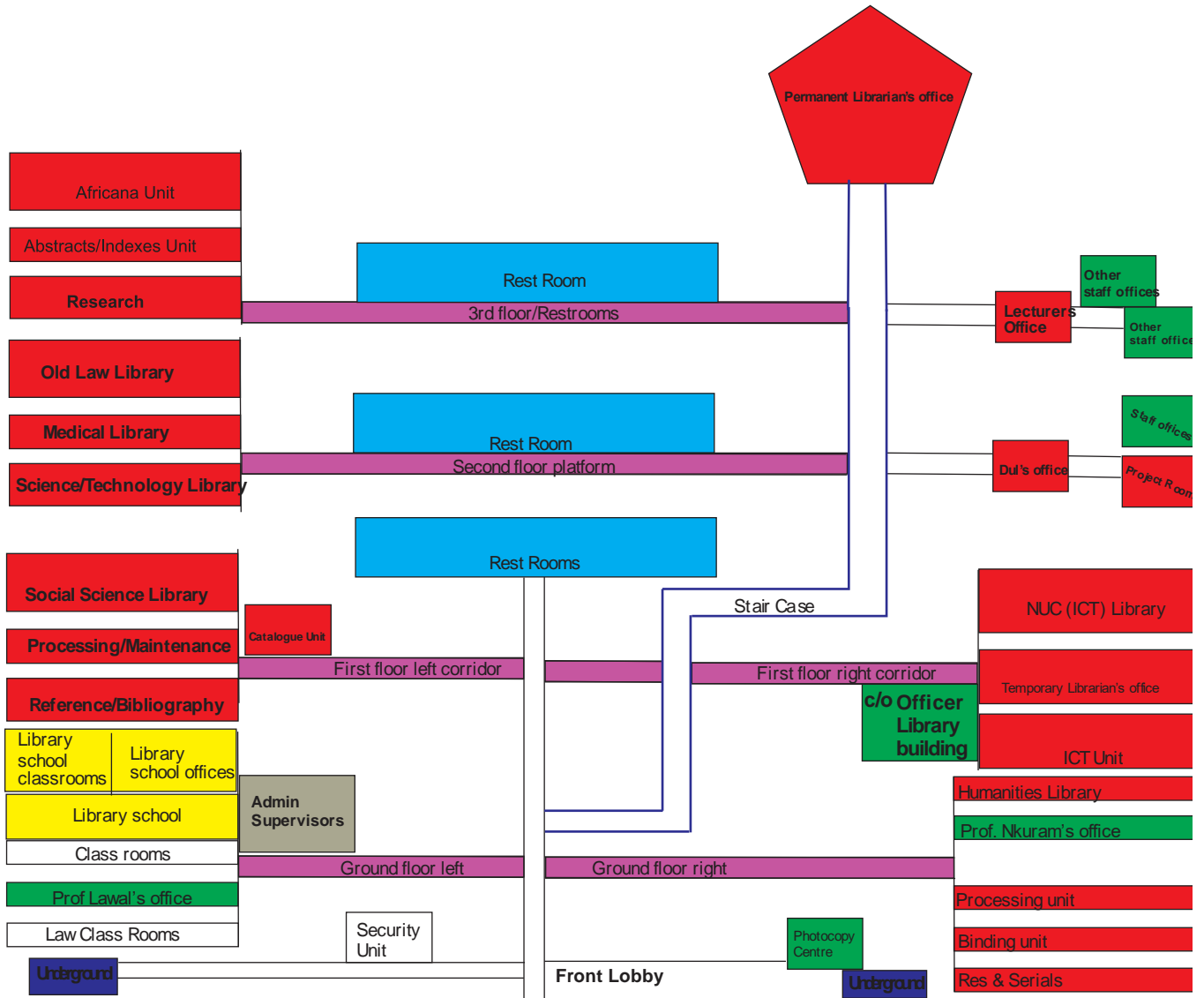


(c) 3-D 100% Stacked Column Chart





**Presentation of functional areas using GIS.**



**Key**

- Red Library functional areas
- Blue Rest Rooms
- Yellow Library school
- Green Library offices

**Functional Areas of University of Calabar Library**

The green colored areas represents library functional areas. It could be observed that other areas not used mainly by the library are almost as spacious as those occupied by the library even though it was supposed to be a definitive library. One could envisage what this adjunct arrangement could bring to the environment and users since this space had to be overtaken by other university staff because of lack of space in their various departments.

Hence, it is hoped that the management would help to relocate these temporal occupants to allow for satisfactory use of the definitive library as one of the marketing strategy to effectively bring back users.

### **CONCLUSION**

The use of GISs is no longer news in libraries as it serves as data analysis and display tools. GISs are used to analyze patron service –area-population and materials data for branch consolidation which help for space management, visualizing spatial distribution of in-library book use and visual representation of facility-use measurements. GISs requires an understanding of computing and the ability to work with visual representation of data in addition to the knowledge and skills typically found in libraries relating to organization of data, knowledge of information retrieval systems, reference services and collection development.

To implement GISs as a strategic direction, commitment is required to developing a special combination of strengths either in individuals or teams. Thus the commitment by library administrations may in fact call for support of several functions such as collection development, data and metadata acquisition, cataloguing of resources, software and hardware, training access, database management and more. This is important and necessary

in this time of information transition and transformation. Finally, becoming literate in GISs or providing GISs information services would be a long-term strategic investment for University of Calabar library that would encourage librarians to have a rethink on current practices with regards to contemporary librarianship.

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