Opportunities and Challenges of Automation Experience by some Academic Libraries in Anglophone sub-Saharan Africa: A Perspective on West Africa

Mini Dissertation by

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14390885

Submitted in partial fulfilment of the requirements for the degree

Master of Information Technology
(By course work)

In the

School of Information Technology

Of the

Faculty of Engineering, Built Environment and Information Technology

University of Pretoria

Pretoria

South Africa

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DECLARATION

I hereby declare that entire work "Opportunities and Challenges of Automation Experience by some Academic Libraries in Anglophone sub-Saharan Africa: A Perspective on West Africa" is my original work produced under the supervision of Prof. Peter Underwood, and all cited works are referenced. The work has never been submitted previously to any institution for any award of certificate or qualification.

Student: Faustina K. Barfi   Supervisor: Prof. Peter Underwood

ACKNOWLEDGEMENT

I express my profound gratitude to God for such a wonderful opportunity. I would like to thank my supervisor Prof. Peter Underwood for his contributions, critiques, constructive advice and correction. I would also want to thank my colleagues for their words of encouragement. I extend my gratitude the following: Paa Kwasi Boamah for his support, Joyce for her time spent on reviewing my work and office colleagues for stepping in for me. My gratitude also goes to the librarians who made their experience and knowledge available on the topic.

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ABSTRACT

The study explored the opportunities, the experience, developments and challenges of academic library automation, with a perspective from Anglophone West Africa, Ghana Nigeria, Sierra Leone, Gambia and Liberia. Literature was triangulated with empirical data to ascertain whether the same elements were present for the resultant countries. Questionnaires were used for the empirical data whilst the Systematic Literature Review (SLR) method was adopted for the secondary data. Findings revealed that majority of the libraries were at different stages in the automation process. The challenges and opportunities discovered were not different from one country to the other.

 Increased access to a wider range of formats, increased resource sharing resulting from Inter Library Loan (ILL), effective and efficient service, increased visibility, fast and convenient service, searchability and discoverability were identified as some of the opportunities.

Development such as the application of open source software, discovery as a search tool, cloud computing, consortia, data security, gamification, Resource Description Access (RDA) and application of mobile devices were gradually exploited by Anglophone West African academic libraries.

Some of the challenges that were discovered include; poor internet connectivity, inadequate technical expertise to manage automated systems, lack of computers, poor cooperation, erratic power supply, inadequate project management skills amongst other.

Recommendations identified to manage the challenges were increased bandwidth to improve internet connectivity, provision of adequate power supply, availability of systems librarians, increased collaboration and consortia, application of project management skills, and capacity of librarians in the areas of advanced Information Communication Technology (ICT) applications.

LIST OF ABBREVIATIONS

CSR-Critical Success Factors

DoI - Diffusion of Innovation Theory

EIFL- Electronic Information for Libraries

ICT - Information Communication Technology

IFLA – International Federation of Library Associations and Institutions

ILS - Integrated Library System

IS - Information Systems

LIS - Library and Information Science

LISA –Library and Information Science Abstract

MARC- Machine Readable Catalogue

NAB - National Accreditation Board

NUC - National University Commission

ODLIS – Online Dictionary for Library and Information Science

OCLC- Online Computer Library Center

OPAC – Online Public Access Catalogue

RDA - Resource Description Access

TAM – Technology Acceptance Module

CHAPTER ONE
INTRODUCTION TO THE STUDY

1.1 Introduction

Academic library automation has become imperative in Africa as a result of the "proliferation of electronic resources, increased and varying needs of patrons and for collaboration purposes" (Mutula, 2012:292, Abubakar, 2011:2 and Arkorful, 2007:1). This paper presents the opportunities and challenges of automation experienced by some academic libraries in sub-Saharan Africa, specifically Anglophone West Africa. The study is presented in five chapters. Chapter one presents the study background, problem statement, study purpose, objectives and a suitable theoretical framework. It further discusses the study research plan and scope as well as the outline of chapters covered. Chapter two introduces the research methodology. Chapter three reviews related literature. Chapter four presents the research findings, analysis and interpretation and finally Chapter five covers the conclusion and recommendations to manage the challenges.

1.2 Background

Increasing student enrolment and introduction of innovative courses, coupled with the vast volumes of information created mostly online has influenced the way libraries operate. The use of traditional methods of "processing, searching, salvaging and accessing information", especially in the academic arena, leaves much to be desired (Arkorful, 2007:1). Librarians, in the quest to make literary resources available to enhance research, teaching and learning have resorted to automation (Mutula, 2012:293). Lately, libraries in Africa have resorted to automation in order to address the varying needs and preferences of patrons, to make significant volumes of electronic resources available, to provide for users wishing to use library services remotely and also to improve inventory control methods (Kargbo, 2009:48).

Further, premiums placed on higher and distance education as a developmental agenda by most African countries have necessitated libraries to automate their services. Though most African libraries may be in different stages in the automation process, challenges and opportunities experienced may not necessarily differ from one African country to the other (Mutula, 2012:292). Studies have indicated that African academic libraries rarely integrate automation at the initial

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stages of library development, while the majority are yet to successfully and fully automate their services (Mutula, 2012:292).

Early automated systems concentrated on the provision of electronic card catalogues and the use of computers in libraries (Sani, 2006:10). Research has clarified that the use of computers in libraries does not necessarily mean automation but rather integration of the library activities such as cataloguing, acquisition, serials, circulation services, digitized resources among others into one platform by the use of library automated systems (Sani, 2006:10).

There is considerable literature on the experience of individuals with library automation and implementation of automated systems in Africa. Limited research has been carried out in sub-Saharan Africa, specifically Anglophone West Africa, on a comprehensive review of the different cases that pertain to academic libraries. This has motivated the researcher to make some exploration into the literature and empirical data on the opportunities and challenges of automation and to ascertain whether Anglophone West African countries have similar experiences. The findings may serve as benchmark to libraries in the process of automating and those intending to automate.

1.3 Library automation definition

Numerous authors have defined library automation and among them are the definitions developed by Lu and Xue (2010), Mittal (2005) and UNESCO (2013).

- *Lu and Xue (2010:268) define automation as the application of computers and networks technologies in the services and operations of library activities such as cataloguing, serials, circulation, OPAC, reporting, amongst others*.

- *"Library automation" refers to the extensive use of mechanical, electronic or microelectronic equipment to perform the basic functions and activities associated with the library* (Mittal, 2005:1).

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- *The UNESCO's programme: Empowering Information Professionals: on Information and Communication Technologies (EIPICT) defines library automation as the application of ICTs to library operations and services: viz., the acquisition, cataloging, public access, indexing and abstracting, circulation, serials management, and reference functions (UNESCO EIPICT, 2013:5).*

The later definition by UNESCO EIPICT (2013:5) emphasises the integration of the various functions of the library. Library automation has become the broader term that describes the application of information communication technologies (ICT) in libraries. It has become the umbrella term which encompasses Integrated Library System (ILS), digitization, and management of repositories, amongst others. Its main focus is on the implementation of an Integrated Library Systems (ILS) into the typical operations of the library. According to Wella (2011:67) library automation is a process whilst an Integrated Library System is the application of library automation software. Library automation basically aims at improving the management of the resources and services of the library, hence the use of appropriate integrated library system plays a crucial role (Thompson & Pwadura, 2014:67). Citing Lu & Xue (2010:268) library automation networks aim to computerize an array of traditional library functions using a common system, thus creating an integrated library system (Reitz, 2004;ODLIS)..

The diagram below depicts the automated system with the various modules such as cataloguing, acquisition, circulation, OPACS, serials amongst others. The diagram establishes a relationship among the modules.

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Figure 1: Automation of library functions

Lam, K.T. (2002:2). Lecture Notes: Issues in Library Automation. http://ihome.ust.hk/~lblkt/diploma/libauto/libauto.html.
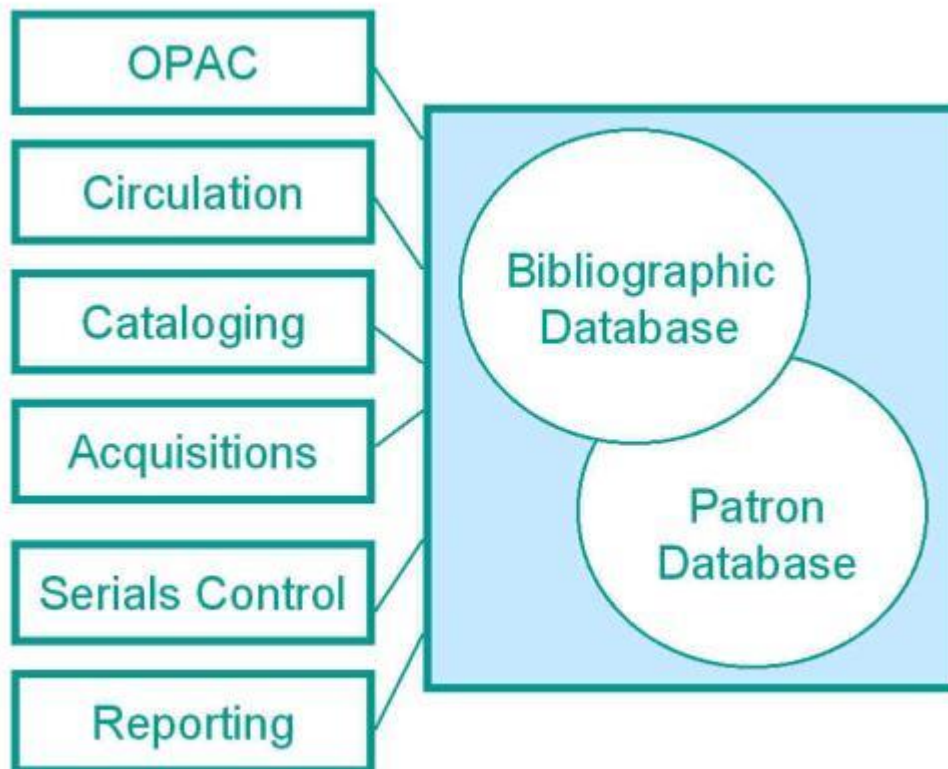
1.4 Theoretical framework

Numerous theories have emerged concerning the adoption and use of technologies; among them are the Diffusion of Innovation Theory (DoI), and the Technology Acceptance Model (TAM). These theories explored the diffusion of innovations and technology by explaining the various reasons why technology is either adopted or rejected in organizations such as libraries, and further seek to explain: "why, what and how". The adoptions of such innovations are dependent on several variables (Chuttur, 2009:2). Moore & Benbasat (1991:193) corroborated this by indicating that the diffusion of innovations in information systems (IS) are mostly subject to variables such as: "advantage, compatibility, complexity, observability, and trialability". The Technology Acceptance Model focuses on users' acceptance of technology by measuring its efficacy and the relative importance (Park et al., 2009:197, Benbasat & Barki, 2007:211). The model has two

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significant variables: Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) to determine factors that influence the adoption, sustainability, rejection or failure of innovation.

"Perceived usefulness" (PU) measures the ability of a system to effectively perform a task, increase productivity or enhance services. "Perceived ease of use" (PEOU) according to Benbasat & Barki (2007, 211) measures the extent by which a system easily facilitates the achievement of goals.

The TAM has evolved and advanced over time and for the purposes of this study, the Technology Acceptance Model 2 (TAM 2) has been adopted. TAM2 according to Venkatesh & Davis (2000: 187) has been expanded to encompass social influence process (subjective norm, voluntariness, and image) and cognitive instrumental processes ((job relevance, output quality, result demonstrability, and perceived ease of use). This is an updated and expanded version of the original model which posits much on PU and PEOU as factors that influence both librarians and patrons in the adoption and use of automated system (Venkatesh & Davis, 2000:186; Park et al., 2009:151). The adoption of this theory highlighted, amongst others, the reasons why academic libraries automate their services, the choice of automated systems, and opportunities derived. The following elements are theorized under TAM2 in relations to library automation as an innovation.

- **Subjective norm** - according to Venkatesh & Davis (2000:188) postulate a significant effect on one's intentions and actions as mandatory. Thus the adoption of innovation such as library automation is considered mandatory especially in the academic environment. Subjective norm signifies the degree of compliance with a situation that is over and above perceived usefulness and perceived ease of use. The application and use of automated systems in libraries seems to have become mandatory to most academic institutions as a result the varying needs of patrons, accreditation purposes and webometric ranking.

- **Voluntariness** - define the extent to which librarians perceive the adoption of innovation to be non-mandatory. It assesses the extent to which individuals have the freedom to implement personal views, customize the system to meet local needs, amongst other. (Moore & Benbasat, 1991:195)

- **Image and social influence** – image is defined as "the degree by which the use of an innovation is perceived to enhance one's status in one's social system" (Venkatesh & Davis, 2000:189). The adoption of such innovations translate into an elevation on one's image. Librarians image as a result of automation are usually elevated. This confirms Mutula (2012:292) that automation of libraries enhances librarians' image and ego. Librarians are respected and distinguished among their peers such as faculty, researchers, partners and students. Librarians' image is projected as well as the library's visibility on the web. There is cognitive increased power and influence resulting from effective job performance, motivation and the innovation to gain such social status among others (Moore & Benbasat, 1991:195).

- **Job relevance** - measures an individual's perception regarding the degree to which a target system apply to one's job. It is the degree by which an innovation positively impact on one's job depending on the set of tasks the system is capable of supporting. The adoption of automated systems integrates and performs library functions such as cataloguing, acquisitions, budgeting, circulation, inventory control, searchability and discoverability amongst others. (Venkatesh & Davis, 2000: 191).

- **Output quality** - this posits how well the system performs the expected tasks (Venkatesh & Davis, 2000: 191). Opportunities derived from automated systems such as fast and easy processing of materials, efficiency in service delivery, resource sharing, remote access, and increased access can be considered as some of the perceived output quality and perceived usefulness of library automation. The application of automated system promote quality assurance in the library operations.

- **Result demonstrability** - assesses the "tangibility, observability, and communicability" of the results of the system (Venkatesh & Davis, 2000: 192 and Moore & Benbasat, 1991). Library automation has modules such as the online public catalogue which facilitates remotes access, the report generation module that aids decision-making, cataloguing, acquisition and serials modules. The adoption of TAM 2 address questions such as: What role does automation play in Western African academic libraries? To what extent can

automation improve the services of libraries? Do librarians and users perceive library automation as a viable system? Are there perceived opportunities from using such systems? What are the barriers to such innovations?

- **Perceived Ease of Use** - TAM2 has expanded this by assessing the versatility of the system. Does the system accommodate demographic, language and format differences? Can the system be exploited by library staff and students? Do patrons find it easy to adjust, learn, and understand the system? Does one require extensive training before implementing and utilizing the automated system? Does the system support migration unto other platforms? How many international standards does the system support? What about it compatibility? Are users able to create accounts? These among others need to be considered by librarians' prior to the selection of the automated systems.

In pursuance to this, the assessment of theories in information communication technologies specifically automation systems has become relevant. According to Venkatesh & Bala (2008:276) The above variables influence ease of use and perceived usefulness of the system's applicability in perceived environments. The adoption of TAM2 describes library automation developments and intentions of adopting such innovation. The diagram below integrates all the components of TAM 2 in a relationship manner.

Figure 2: Technology Acceptance Model 2 (TAM2)
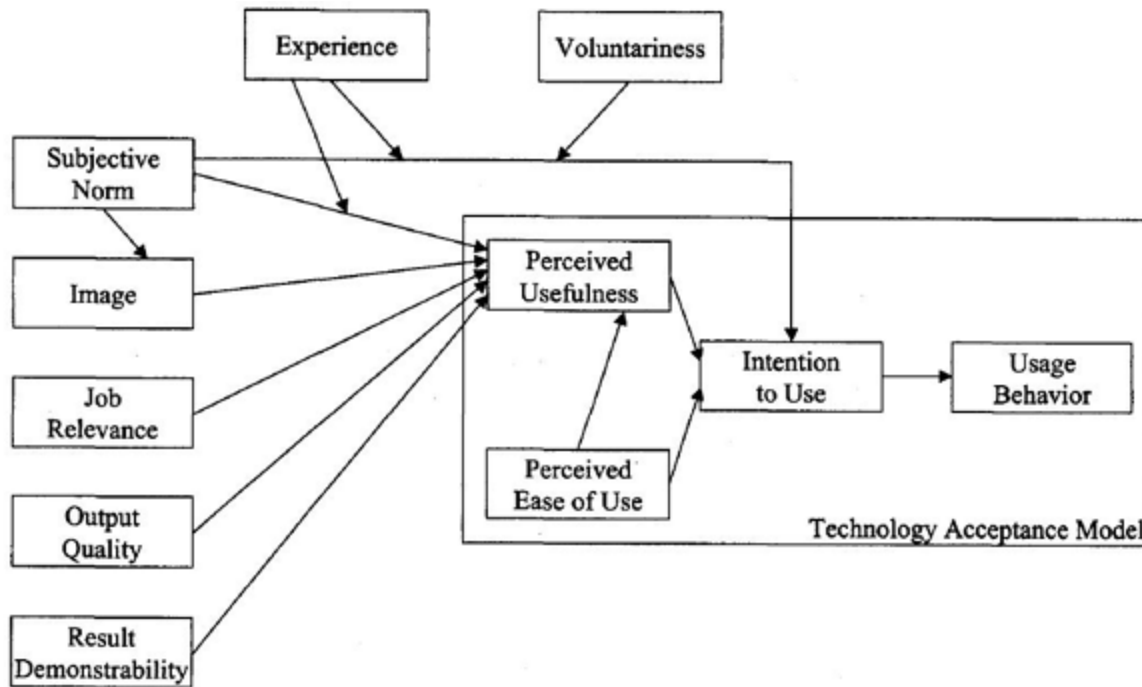
Source: Venkatesh & Davis (2000:188)

1.5 Problem Statement

There are numerous accounts on library automation theories and practices based on Western literature and environments. Several discussions have lately emerged from Africa.

Cross sectional studies on academic library automation have taken place in sub-Saharan Africa notwithstanding the limited in-depth studies on critically exploring the opportunities and challenges of the different individual cases especially in Anglophone West Africa. Automation may have numerous benefits as well as challenges. There is therefore no doubt that, sub-Saharan Africa and for that matter West African libraries may have experienced some of these challenges in their quest to automate.

Whilst libraries in the developed world have fully advanced in the use and management of library automated systems, libraries in Africa rarely boast of a complete automated system (Boateng,

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Agyeman & Dzandu, 2014:6).The Standish Group 2014 CHAOS Report (Standish Group, 2014:3) has revealed ICT project failures especially in Africa and the inability of libraries to successfully implement and sustain automated services. Experience has shown that issues of inappropriate choice of software, high software turnovers, cover up of failures, and absence of rationalization have compounded failures of automation projects (Kari & Baro 2014:17). This concern amongst others can be attributed to the limited literature on consolidated cases of different automated cases that may serve as benchmark for libraries that have automated, or are intending to automate. The absence of a consolidated cases makes it possible to repeat the same mistakes over and over again.

Citing Coyle & Hillmann (2007:2) the library of the future and now is subject to significant different challenge as a result of radical change in computer technology and electronic document production than libraries experienced before. ICT as an enabling tool in academic library automation is developing at a faster rate. Recent innovations, standards and technological advancement have led to a significant acceleration. However, compounding the challenges are limited insight and coverage of current developments, modalities, commonalities, standards, differences and changes which as a result have contributed to the failures of academic library automation.

Academic library automation is not implemented in isolation. Interrelated units such as finance, IT unit, the procurement and logistics, faculty, stakeholders, amongst others, play a role. In such cases, does shared decision making usually slow down the process? What are the experiences of Anglophone countries? Do Anglophone West African libraries experience bureaucracy in the form of administrative bottlenecks in their pursuit of automation? To what extent does this affect library automation? The study aims to probe the above-mentioned challenges as well as to identify other challenges that hinder academic library automation based on the Anglophone West African perspective. It is intended to explore literature on the past years and current empirical data in order to ascertain what has happened since.

1.6 Study objectives / study   Focus

The study focused on exploring the automation experience of some academic libraries by triangulating empirical data and existing literature on individuals' experiences on academic library automation and implementation of library automated systems. Experiences highlighted would serve as benchmark for libraries which intend to automate their services. Challenges identified would serve as a guide to librarians who plan to automate their libraries. The opportunities explored would motivate and serve as a drive to those who have automated their libraries and those who intend to do so. The following have been identified as components necessary to achieve the study objectives:

i.   Role of automation in academic libraries.
ii.   Academic library automation profile in sub-Saharan Africa..
iii. Developments and current trends of automation
iv.   Outline modalities, commonalities and differences experienced on academic library automation.

1.7 Sub questions

- What role does   automation play in academic libraries in sub-Saharan Africa?

- What profile has academic library automation?

- What are the current trends and development in the automation environment?

- Are there opportunities for academic library automation?

- What are the challenges to academic library automation?

- Are there appropriate recommendations to manage those challenges?

1.8 Scope and limitations

This study aims to identify the opportunities and challenges experienced by some academic libraries among English speaking Countries in West Africa: Liberia, Nigeria, Sierra Leone, Gambia and Ghana. The principal point is that findings would be reflective of the set of cases and cannot, thus, be generalized to sub-Saharan Africa; rather they would be indicative of the issues that other institutions seeking to automate might have faced. The empirical data was limited to some selected libraries in Ghana, while review of literature was limited to a period of a

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decade (2004-2014 and beyond). The study was limited to English speaking countries as a result of limited time and language differences. It is also confined to academic libraries within West Africa.

1.9 Research Methodology

Literature searches for a period of a decade and empirical data from senior academic librarians were triangulated and analyzed in order to ascertain whether the same elements were present. Principal databases in Library and Information Science field such as *Library Information Science and Technology Abstracts* (LISTA) and *Library and Information Science Abstracts* (LISA), books, journal articles, reports, amongst others were used.

1.10. Overview of chapters

The study is organized in five chapters with an introduction to each chapter.

Chapter One

Chapter one presents the introduction and background of the study, the problem statement**,** the objective, appropriate theoretical framework for the study and the research plan.

Chapter Two

Discusses the methodology used to answer the research questions. It describes how literature was selected and reviewed both empirical and secondary data. The following are covered:

- ➢ Guide to literature review
- ➢ Mode of data collection
- ➢ The methods and tools employed.
- ➢ Selection of respondents.
- ➢ Analysis of data
- ➢ The presentation of data.

Chapter three

Reviews literature on automated cases and examined related literature on academic libraries. It explains what automation is, its impact on academic libraries**,** current development and trends, its opportunities and challenges. The following thematic areas are considered:

- ➢ Role of academic library automation in sub-Sahara Africa
- ➢ Academic libraries automation profile in Africa
- ➢ Review of current trends and developments
- ➢ Opportunities for academic library automation
- ➢ Challenges to academic library automation

Chapter four

Presents the data analysis and interpretations .It highlights the findings discovered by looking at the following themes:

- ➢ Automation role in academic libraries in sub-Sahara Africa
- ➢ Profile of academic library automation
- ➢ Current trends and developments in the automation environment
- ➢ Prevailing opportunities
- ➢ Challenges experienced
- ➢ Recommendations to manage challenges
- ➢ Summary of findings

Chapter 5

This chapter presents the findings, recommendations and conclusion. It presents the summary of the study and appropriate recommendations based on findings.

1.11 Definition of terms

Integrated Library System: This is a software package use to automate library activites.

Automation: the process and application of ICT to perform library functions in an integrated manner.

Academic Libraries: higher educational institution library that aims to support the institutional curriculum (research, teaching, learning and training).

Opportunities: they are the benefits or merits derived from a process.

Challenges: they are barriers that hinder productivity or progress.

CHAPTER TWO

RESEARCH METHODOLOGY

2.1 Introduction

This section discusses the research methods adopted for the study. The study adopted the qualitative approach, aiming to investigate and confirm the findings of the Systematic Literature Review (SLR) on the opportunities and challenges of automation experience by some academic libraries. Series of cases were analyzed on the modalities, experiences, commonalities and the differences of academic library automation in the African sub-region, specifically Anglophone West African countries. This chapter discusses the research methods and strategies used to gather the data on the study. The methods adopted for the literature inclusion and exclusion, data collection and instruments, selection of respondents and data analysis.

2.2 Methodology

The study surveyed the existence, extent and characteristics of library automation experiences; this makes it *descriptive* rather than *analytical*. It compiles and explains the phenomenon using both empirical and secondary data. Questionnaires and systematic literature review methods of data collection were used to solicit views from librarians to triangulate the data collected from the cases presented in the literature. Triangulation enables one to corroborate findings as well as enhance validity (Pickard, 2013:3). The study adopted the qualitative method. (Myers, 2015: Qualitative).

2.3 Systematic Literature Review (SLR)

A number of approaches exist for conducting reviews of literature. Okoli & Schabram (2010:2) have identified three general kinds, namely: the "theoretical background, the literature review and the stand-alone literature also known as systematic literature review", the latter term often abbreviated to SLR. Considering the research scope, "opportunities and challenges of automation experienced by some academic libraries", the Systematic Literature Review (SLR) approach was adopted. Systematic Literature Review (SLR) has been defined by Fink (2013:3) as "rigorous stand-alone literature review in a systematic way that follows a methodological approach, explicit in explaining procedures by which it was conducted, comprehensive in its scope by including all

relevant material, and reproducible by others who would follow the same approach in reviewing the topic"

According to Adolphus (2012: Systematic review) "evidence-based, scoping, or systematic literature review" (SLR) reduces bias and provides a comprehensive body of knowledge on a particular subject, and/or evidence for a particular intervention, such as this. Petticrew & Roberts (2006: Systematic review), Fink (2013:3), Webster and Watson (2002: xiii) and Okoli and Schabram (2010:3) have corroborated the advantages of using the systematic literature review approach.

The adoption of the SLR guided the exploitation of implicit trends, requisite characteristics and assessment of results in-depth. It further guided the assessment and aggregation of the research outcomes, thus opportunities, trends, developments, experiences and challenges. This corroborates Brereton et al., (2007:571) and Tranfield, Denyer & Smart (2003:209) that SLR "produces a balanced and objective summary of research evidence on particular topics, it synthesizes research in a systematic manner, transparent, reproducible, and facilitates policy formation and decision making". The systematic literature review process was considered appropriate since it enabled the tracking of developments and technological trends. This approach confirms Fink (2013:17) that application of SLR is considered appropriate for information science researchers' because it identifies trends, developments and gaps.

2.4 Benefits of the Systematic Literature Review (SLR) for the study
The following were the reasons for adopting SLR:

> ➢ It guided the researcher on an in-depth analysis of the opportunities and challenges of library automation cases

> ➢ Its application enabled the researcher to critically and systematically review literature in a chronological framework and thematic model

> ➢ The use of the SLR enabled the tracking of developments, experiences and failures in automated cases

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➢ Its application facilitated easy summarization of automated evidence

➢ Its application facilitated the identification of areas for future and advanced research

2.5 Guide to literature search

Levy & Ellis (2006b:171) in their article on conducting literature reviews in the context of information systems research, identified the systematic data process approach to comprise of three major stages: "inputs, process and outputs". According to them the input comprises the following elements: "defining search terms, identifying databases and literature sources, querying systems, search strategies, data retrieving skills, literature validation", amongst others (Levy & Ellis, 2006b:179).

The second, the "process stage" according to Levy & Ellis (2006a:182) connotes "sequential steps to comprehend, apply, analyze, synthesize and evaluate literature" in order to provide a firm foundation to a study.

The third stage, the "output stage, comprises writing the actual literature, analysis, write-up and synthesizing its impact on advancing knowledge" (Levy & Ellis, 2006b:179, Bandara, Miskon and Fielt, 2011: 4).It also creates points for discussion and conclusions (Webster & Watson, 2002: xx).

2.6 Strategies /procedures adopted

The various strategies identified by Adolphus (2012: Systematic review) and Okoli & Schabram (2010:7) were reflective of the approach by Levy & Ellis (2006b:171) to the systematic literature review framework categorized as "input, process and output". This further corresponded to the four systematic tools developed by Bandara, Miskon & Fielt (2011: 4) in information systems research, thus: "identification and extraction of articles, analysis, coding and write-up".

Figure 3: *SLR framework*

The diagram below illustrates the SLR framework employed (Levy and Ellis, 2006b:179)
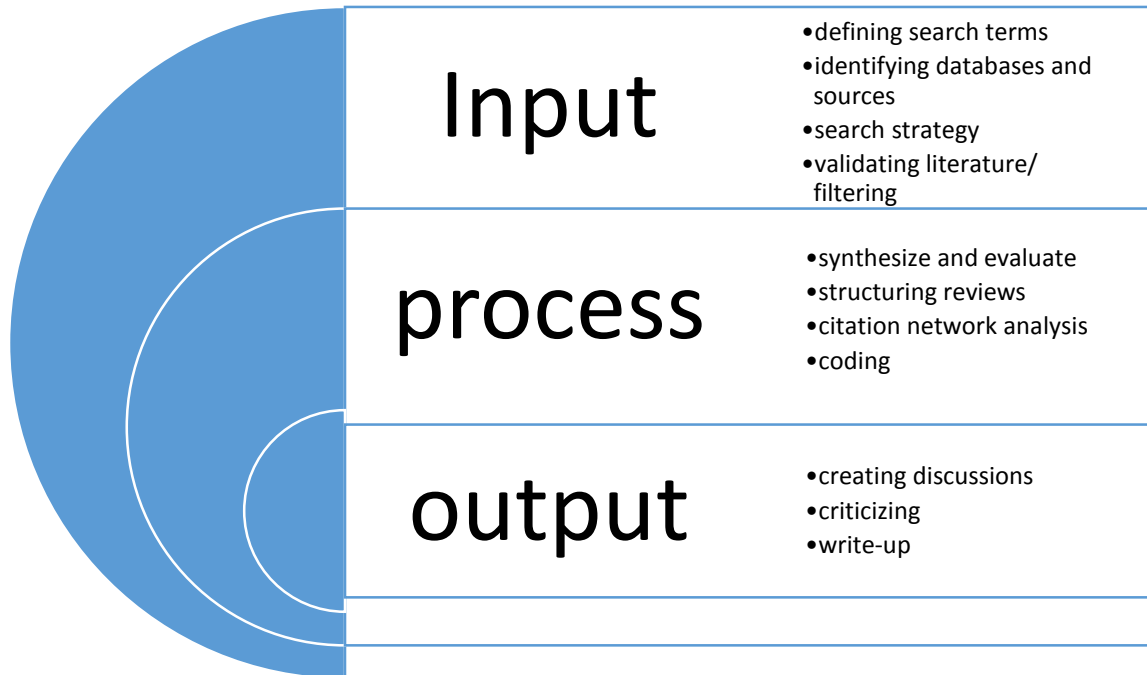
Input strategies employed for the data collection

i. identification of key concepts thus "academic libraries, library automation, opportunities and challenges"

ii. identification of sources – databases such as Library and Information Science (LIS), educational resources, books amongst others

iii. formulation of queries

iv. application of search strategies (keyword, subject, and Boolean operators)

v. validation and filtering of literature using publication dates, relevance, language, cases,

vi. retrieval of relevant literature

Process strategies

i. synthesis and evaluation

ii. structuring reviews

iii. citation network - the Zotero application was used to guide the referencing

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Output

    i.   creating discussions
   ii.   writing-up
  iii.   summarizing

Inclusion and exclusion of literature

Inclusion of literature

Based on the scope, the following inclusions were made:

    i.   Databases and sources from Library and Information Science (LIS) such as: *Library Information Science and Technology Abstracts* (LISTA), *Association for Computing Machinery (ACM) Digital Library*, *Library and Information Science Sources*, *Serials Directory*, *Education Resources Information Center* (ERIC), *Library Literature and Information Science*, *Academic Search Complete*, *Emerald Management Xtra* and *Library and Information Science Abstracts* (LISA) databases.

   ii.   Publications with cases on sub-Sahara Africa

  iii.   Publications within a period of a decade and beyond (2004 – to date)

Exclusion from literature

Publication before 2004

Publications outside the scope of the English language

Search terms

The search began from the broader to the narrower using the Boolean operator AND

    i.   Academic library automation AND Africa.

   ii.   Academic library automation profile AND West Africa.

  iii.   Role of automation AND libraries.

  iv.   Current developments AND automation.

   v.   Library automation AND opportunities

  vi.   Library automation AND challenges

Specific limits

    i.   Literature from 2004 -2014 and beyond
    ii.   Academic libraries automation cases in sub-Saharan Africa
   iii. English language publications

2.7 Data collection scope

A number of papers have been published on academic library automation ever since automation was initiated in Africa (Rosenberg 2006:290). The study explored literature on a series of automated cases within a period of a decade. This was because research about technology within a decade is likely to be of value, whereas earlier literature is likely to be of historic interest only. The literature coverage focused on Western Africa, which is made up of French speaking, Portuguese, and English-speaking territories, amongst others. Considering the language knowledge of the researcher, it was decided that the study would be limited to Anglophone countries within Western Africa. The resultant set consisted of five countries: Liberia, Nigeria, Sierra Leone, Gambia and Ghana.

2.8 Empirical data collection scope

Following the results of the literature survey, some senior academic librarians were identified and contacted for opinions in order to verify facts and to gain a deeper insight. Opinions of senior librarians who had at least three years' experience in academic library automation were considered. This afforded the units the opportunity to present sufficient in-depth data reflective of the set of cases experienced. End-users experience automated services via the OPAC and circulation, but the study involved only senior librarians who offered answers to the deeper issues associated with the research problem: the opportunities for academic library automation, the current state, the challenges, experiences and recommendations.

2.8 Selection of respondents

Considering the knowledge scope of the study and willingness of respondents' participation, five (5) senior academic librarians became the resultant population. This was because exploring on the opportunities, experiences and challenges of academic library automation required librarians with homogenous characteristics. Concentrating on the unit with such particular characteristics; five senior librarians from Ghana in automated academic libraries were selected from University of

Ghana (UG), University of Cape Coast (UCC), Kwame Nkrumah University of Science Technology, University of Education Winneba (UEW) and the University for Development Studies (UDS). Findings cannot, thus, be generalized to sub-Saharan Africa but rather are indicative of the issues that other institutions seeking to automate, and others that have automated, might have faced or are likely to face. In order to select a population that can provide suitable data in terms of relevance and depth, senior librarians with at least three (3) years academic library automation experience were considered.

2.9 Data collection mode

A questionnaire was the main instrument used for the data collection. Both closed and open-ended questions were used. The open-ended questions enabled respondents to express their own views and suggestions. The questions were emailed to respondents, affording them the opportunity to access them remotely and at convenient times.

2.10 Data Analysis

Literature and empirical data from the selected universities were triangulated to arrive at findings.

The table below presents literature extracted using the above strategies. An analysis of these served as evidence of individual cases of institutions and others that have undergone automation practices.

Literature extract: Table 1

Database/source	Publication	Case
ERIC	Mutula, S. M. 2012.Library automation in sub Saharan Africa: case study of the University of Botswana*: Electronic library and information systems*, 46(3): 292-307	University of Botswana
Library Information Science & Technology Abstracts	Adanu, T. S. 2006. Planning and implementation of the University of Ghana Library Automation Project. *African Journal of Library, Archives & Information* Science 16(2): 101-108	University of Ghana
Emerald management	Rosenberg, D. 2006. Towards the digital library in Africa *Electronic Library,* 24(3): 289-293	Africa Digital Libraries
Emerald management	Egunjobi, R. A., and Awoyemi, R. A. 2012. Library automation with Koha. *Library Hi Tech News*, 29(3): 12 - 15	Nigeria
Mortenson Center for International	Mortenson Center for International Library Programs. [2013]. *Developing automated libraries Phase II: a Professional*	Africa Automated

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Library 2008 Programs	*Development and Technical Assistance Program for Carnegie Grantee Libraries in East and West Africa. Final report.* http://www.library.illinois.edu/mortenson/activities/reports/Carnegie_Final_report.pdf	East and West Africa automated Libraries Report
Sabinet reference	Wella, K. 2011. Planning for the University of Malawi Library automation. *Innovation: Journal of Appropriate Librarianship and Information Work in Southern Africa,* 43: 66-83.	University of Malawi
Sage publications	Stilwell, C., and Hoskins, R. 2013. Integrated library management systems: a review of choices made and their sustainability in South Africa. *Information Development,* 29(2): 1-18	South Africa
Digital commons	Boateng, H., Agyemang, F. G., and Dzandu, M. D. 2014. The pros and cons of library automation in a resource challenged environment: a case study of KNUST Library. *Library Philosophy and Practice (e-journal)*, paper 1061.	KNUST Library, Ghana
Library, Information Science & Technology Abstracts	Otunla, A.O. and Akanmu-Adeyemo, E.A. 2010. Library automation in Nigeria: the Bowen University Library experience, *African Journal of Library, Archives and Information Science*, 20(2): 93-102	Bowen University Library, Nigeria
Emerald management	Makori, E.O. 2012. Bridging the information gap with the patrons in university libraries in Africa. *Library Review*, 61(1): 30–40	University Libraries in Africa
Emerald management	Kari, H. K. and Baro, E.E. 2014. The use of library software in Nigerian University Libraries and challenges. *Library Hi Tech News*, 31(3): 15 - 20	Nigerian University Libraries
IFLA	Arkorful, M. A. 2007. Implementing online catalogues in African academic libraries: the collaborative role of international partners in improving access to valuable research materials. Paper presented at the World Library and Information Congress and 73rd IFLA General Conference and Congress, Durban, 19-23 August 2007. http://archive.ifla.org/IV/ifla73/papers/145-Arkorful-en.pdf	African Academic Libraries
Emerald management	Kavulya, J.M. 2007. Digital libraries and development in Sub-Saharan Africa: a review of challenges and strategies. *The Electronic Library*, 25(3):299-315	Digital Libraries and sub-Saharan Africa

2.11 Summary

This chapter discussed the research methodology and design adopted. This was a descriptive study that adopted the qualitative approach. Literature was collected using the systematic literature review (SLR) method. Empirical data were solicited from senior librarians who had at least three years automation experience. Both data were triangulated to ascertain answers to the research problem by exploring the opportunities, experience, current trends and development and challenges of academic library automation. The empirical data and literature were analyzed to ascertain whether the same elements were present. Findings cannot, thus, be generalized to sub-Saharan Africa but rather are indicative of the issues that other institutions seeking to and others that have automated might have faced.

CHAPTER THREE

LITERATURE REVIEW

3.0 Introduction

This chapter is dedicated to reviewing available literature on the opportunities for academic library automation, trends and developments, experiences, profile, initiatives and challenges experienced by African academic libraries. In order to track developments, technological trends and experiences, literature for a period of a decade (2004-2014 and beyond) was considered. This is because research about technology ought to be current. Research outcomes within a period of a decade is still of value, whilst older material would be of historic interest. A literature review according to Webster & Watson (2002: xiii, xix) indicates a firm foundation for "advancing knowledge, facilitating theoretical development, identifying areas where a plethora of research exists, and uncovers areas where research is needed". This section focuses on profiling automation experience by some African academic libraries.

Levy & Ellis (2006b:172) identified the following characteristics for an effective literature review in the field of Information Systems Research: "methodological analysis, synthesis of literature and the review being able to contribute something new to the overall body of knowledge as well as advancement in the research scope". The following thematic areas are considered:

- ➢ Role of academic library automation in sub-Sahara Africa
- ➢ Academic libraries automation profile in Africa
- ➢ Review of current trends and developments
- ➢ Opportunities for academic library automation
- ➢ Challenges to academic library automation

3.1 Literature search strategy adopted

The study was guided by parameters, thus contrasting the views presented in scholarly African literature on academic library automation by identifying the opportunities, gaps, themes and trends. It is purely descriptive with the focus on publications within a period of a decade. Library and Information Science (LIS) literature across a number of academic and peer reviewed databases, such as: *Library Information Science and Technology Abstracts* (LISTA), *Library and Information Science Abstracts* (LISA), Ebsco's *Library and Information Science Sources* and *Serials Directory*, *Education Resources Information Centre* (ERIC), *ACM Digital Library*, amongst others. Standard search strategies with the following key terms were used: "academic libraries, library automation, automation trends and sub-Saharan Africa". Considering the study scope, certain inclusions and exclusions were made.

Literature inclusion
 iv. Publications with cases on sub-Saharan Africa
  v. Databases and sources from Library and Information Science (LIS)
 vi. Peer reviewed literature
vii. Publications within a period of a decade (2004-2014 and beyond)

Exclusion from literature

  i. Publication before the year of 2004
 ii. Non English language literature

Key search terms
- Academic Libraries
- Library automation
- Academic libraries automation and sub-Saharan Africa
- Automation opportunities and challenges

3.2 Role of academic library automation in sub-Saharan Africa

Academic libraries in developing countries according to Abubakar (2011:2) serve as a major supporting tool in academic institutions for the purposes of "teaching, learning and research". The

changing and varying needs of these academic institutions have therefore propelled a "digital revolution, transitional processes, new products and services". Descriptions like "libraries without boundaries, paperless libraries, digital libraries" amongst others have promulgated the change. The question therefore is: do academic libraries in Africa like those in advanced countries taken on this new phase? Research has revealed automation amongst others as one of the impetuses, but to what extent has this impacted on African libraries? In what ways are services offered by African libraries affected by automation?

Abubakar (2011:2) is of the view that automation enables libraries to serve global as well as locally dispersed clientele. Universities in Africa such as University of Botswana according to Mutula (2012:292) have experienced "increased access to a diversity of electronic resources, acquisition of new skills, and increased roles and responsibilities for librarians". Banjo commented that automation offers: "speed, accuracy and efficiency in the processing, presentation and retrieval of information". It also facilitates sharing of resources among libraries in "Ghana, Kenya and Nigeria" (Banjo, 1993:85).

Hopkinson (2009:3) further indicated that, academic libraries in developing countries could experience extensive access to information resources via automation. There is the tendency to minimize costs, because of the limited acquisition budget available to individual libraries. Nevertheless Ogunsola & Okusaga (2008:43) mentioned facilitation of remote access to extensive collections of books and journal titles as some of the benefits derived from automated library services. Benefits such as projection of visibility, freeing of space, increased collaboration, amongst others, have been identified.

Nkanu & Okon (2010:5) further highlighted that the application of library automation has brought innovations meant to bridge the seemingly wide gap that existed between traditional and modern methods of information organization and delivery in Nigeria. Retrieval and dissemination of large volumes of information has become possible as a result of automation, this notwithstanding the problems of having to manage access to information in different formats (Nkanu & Okon 2010:5). Additionally Kargbo (2009:50) attests to the fact that management of grey literature via automation has become possible in Sierra Leone.

The above attest to the fact that automation has impacted on the majority of the operations of the libraries. In spite of these considerable benefits, the majority of academic libraries in sub-Saharan Africa are yet to successfully and fully automate their services, according to Mutula (2012:292).

3.3 Academic library automation profile in sub–Saharan Africa

A study by the International Network for the Availability of Scientific Publications (INASP) surveyed 107 libraries in twenty countries to assess the state of digitization in university libraries in sub-Saharan Anglophone Africa (excluding South Africa). Findings revealed that automation of university libraries in Anglophone Africa started in the early 1990s. Only fifteen percent (15%) had fully automated their libraries as at 2006 (Rosenberg, 2006:290). The acquisition, integration and implementation of library management systems for automation purposes were found to be minimal then.

However, the situation in Southern Africa was different; the Ford Foundation, the Mellon Foundation and the Carnegie Corporation were active in supporting the development of some South African academic libraries from the 1990 onwards. Building on the work of the 1990s, increased support began to be made available from the year 2000 onwards for some selected libraries from West and East Africa. The granting institutions chose to coordinate work in a joint funding programme called "Partnership to Strengthen African Universities", with funding initially for five years (Arkorful, 2007:4). Funding was made available to universities in Ghana, Nigeria, Uganda and Tanzania to automate their libraries to promote global knowledge sharing (Arkorful, 2007:4).

Automation of services on main campuses developed quite swiftly; however, service to branch libraries and satellite campuses were often of an inferior quality because of inadequate network capacity. Inadequate internet connectivity, which has been a major challenge persistent over the years, has seen measures such as regulation of telecommunications and calls for increased open markets. Also liberalization of the industry has recently resulted in competitions that have led to improved progress. Further, considering the initiatives of the Economic Community of West African States (ECOWAS) such as development of ICT policy framework and plans, Western

Africa is envisaged to experience an enabling environment, [nevertheless] like counterparts in Eastern and Southern Africa (Mutula, 2008:479).

3.3.1. Funding academic library automation

Eneya (2008:74) and Wella (2011:67) commented on the University of Malawi Library automation project that was funded by the Rockefeller Foundation, and had the objective to automate the library union catalogue of five college libraries. Ghana's University for Development Studies, Navrongo Campus, was also funded by the Teaching and Learning Innovation Fund (TALIF) to undertake a library automation project (Thompson & Pwadura, 2014:69). In the light of the above, it could be deduced that African academic libraries automation projects have been extensively supported externally. This corroborates Hopkinson's (2009:7) findings concerning major contributions and funding invested in academic library automation projects in developing countries. Amongst the beneficiary institutions was the Makerere University in Uganda, funded by the African Virtual University Library Initiative of the World Bank to equip its Library with computers and internet connectivity.

The above allude to the fact that external support has been a major backbone crucial to automation projects in Africa. Considering the enormous benefits derived from automation, the question however is not whether to automate but how to implement and sustain library automation projects. Though some academic libraries have resorted to locally generated and national funds, this according to Arkorful (2007:3) and Bukirwa (2015:6), were usually minimal and substantially augmented by international partners with financial support and capacity building to maximize the use of technologies. Library automation has become known in all spheres of libraries due to its efficiency and effectiveness (Corall, 2012:7), hence the need to sustain it. Libraries ought to explore avenues to initiate and sustain such projects. In as much as funding is crucial, securing the right technical, infrastructural and capacity-building is equally important.

The availability of partners such as the International Network for the Availability of Scientific Publications (INASP), the Electronic Information for Libraries (EIFL), Research4Life, and the Carnegie Corporation of New York still contribute immensely to library automation projects in the areas of capacity-building and funding subscription to electronic databases on subsidized fees (Powel, 2015:1; Ogunsola and Okusaga, 2008:45). The programme, "Master of Information

Technology (MIT) Carnegie Stream B", administered by the University of Pretoria is one example of capacity-building initiative to assist in the enskilling of professionals in the sub-region. Other sponsors of similar programmes include the Online Computer Library Center (OCLC) and the Mortenson Center for International Library Programs (Mortenson Center for International Library 2013:2). The above developments point to the fact that many libraries in this group depend on external support.

3.3.2. Choice of automated system

Further to this is the choice of Integrated Library System (ILS) used. This plays a critical role in the automation project success. Selecting software that facilitates different processes and activities in the library is an essential building block in the library automation project (Bukirwa, 2015:3, Egunjobi & Awoyemi, 2012:12 and Imo & Igbo, 2011:3). The automated system in use usually impacts on benefits and challenges experienced. This attests to the fact that successful automation projects are partially attributed to the automated library system adopted.

The identification of software and sources of bibliographic records still remain critical. A number of elements are usually considered before selecting an automated or Integrated Library System (ILS). Egunjobi & Awoyemi (2012:12) and Kari & Baro (2014:18) identified, on the part of most academic libraries, the challenges posed in choosing an appropriate ILS. Issues such as cost, infrastructure, systems support, technical amongst others ought to be looked at. Egunjobi & Awoyemi (2012:12) and Aziz & Salleh (2011:75) suggested the importance of defining Critical Success Factors (CSF) for all library automation projects. The application of CSF is deemed appropriate in order to embrace both internal and external elements. In view of this, Roztocki &Weistroffer (2011:163) drew attention to the determinants of IT systems projects success or failure in developing countries: this, according to them, may differ from the generally accepted success factors in advanced countries. The selection of software based on catalogues, reports from colleagues, conference presentations, amongst others, may not be the best approach: rather, a thorough need of assessment is recommended (Egunjobi & Awoyemi (2012:12). This affirms a statement by Ogbenege & Adetimirin, (2013:15) and Arkorful (2007:7) that the adoption of robust and tested software is commended.

Further studies conducted by Rosenberg (2006: 290) revealed that eighty percent (80%) of libraries in Anglophone Africa had initiated library automation at different speeds and stages, using a total of twenty (20) different integrated library systems. In as much as individual libraries select suitable systems appropriate for use, Asamoah-Hassan (2008:10) considered the impact of the adoption of different integrated library systems (ILS). Findings revealed that the adoption of different ILS might impede sharing of costs and expertise in the case of consortia; though it had to be recognized that one system might not necessarily work for all, considering the differences in environments. The use of a consortia approach was recommended to consolidate gains. There is the need for vibrant library consortia and participation to champion some of these issues (Stilwell & Hoskins, 2013:15, Kargbo, 2009:47 and Asamoah-Hassan 2008:10).

3.3.3. Implementation of library automated systems

On the implementation of library automation systems, Eneya (2008:75) considered that automation should be managed as a project to facilitate easy monitoring. Training on project management and its application in project implementation was laudable (Mortenson Center Report, 2013:12). The Carnegie Grantee Libraries in East and West Africa prior to implementation of the various automated systems were exposed to project management skills. This is also the opinion of Wella (2011:66). It is recommended for librarians to acquire project management skills in order to deliver on time, scope and budget.

Managing an automated library system requires skillful and knowledgeable librarians especially in the areas of information communication technology (ICT)**.** Cataloguers particularly need to be abreast with international standards such as Machine Readable Catalogue (MARC) and Resource Description Access (RDA). Building the capacity of librarians on the implementation and use of automated system was recommended in the Mortenson Center Report, (2013:7). There is no doubt that, implementation of the Carnegie Grantee Libraries in East and West Africa was successful due to intensive training and capacity building.

Profiling academic library automation in sub-Sahara Africa has revealed the varying support for automation projects via external partners. Libraries in recent times have resorted to other sources of funding to sustain automation projects. Though there seems to be increased awareness in

adoption and implementation of library integrated systems, successful project were cushioned by external partners in the areas of infrastructure, capacity-building and technical assistance. Critical among the points raised was the choice of ILS and its implementation strategy. The application of critical success factors and cost benefit analysis prior to implementation and managing automation as a project in order to maximize benefits were outlined. (Kavulya, 2007: 302).

3.4 Review of automation trends and developments

The following developmental themes and trends were worth considering because of their impact on automation functions: proprietary versus open source, sequence of adoption, ICT support, cloud computing, security and sustainability, amongst others.

3.4.1 Proprietary versus open source

Automating an academic library usually requires an Integrated Library System (ILS) (Webber & Peters, 2010:1). This is because all the activities of the library, such as cataloguing, online public catalogue, acquisitions, circulation, serials and reporting ought to work in an integrated manner to promote efficiency (Webber & Peters, 2010:2). When the library management system shares a common database to perform all the basic functions of a library, the system is said to be integrated, hence "Library Management System" (Bukirwa, 2015:3). An integrated library system according to Webber & Peters (2010:1), can be acquired through the under listed available means: "turnkey, stand-alone, in-house development, cloud computing, off-the shelf purchase and open source". An institution may therefore opt for any of these depending on the variables considered appropriate.

Considering the above, decisions in selecting and recommending an ILS require an assessment of its impact on staff, patrons and network resources, which is usually the case for the majority of technological innovations. This corroborates the Technology Acceptance Model's "perceived ease of use" by staff, users and the institution as a whole. Does the institution want to use commercial software over open source? What kind of technology is available and suitable to meet the proprietary or open software, be it infrastructural or technical?

Hopkinson (2009:10), Egunjobi & Awoyemi (2012:12), Ogbenege & Adetimirin (2013:12), Abdussalam & Saliu (2014:15), Kari & Baro (2014:18) and Palumbo (2012:8) recommended open source software as a solution to some of the problems facing the library software industry. Open source software has its programme code open and free, hence an economic advantage to adopting an open source software solution though mastering open source software might take a lot of time and effort. Eneya (2008: 83) corroborated this by recommending Koha among others since it is open and free. Considering the high cost of subscription fees for the use of proprietary software, open source can certainly be considered to have potential. Though it may be a better option in terms of cost, it may require considerable expertise to be able to customize it to suit a particular library. Like other systems, regular upgrades are recommended as well (Eneya 2008: 83). The open library environment project specifically supports open source software for research and academic libraries.

Proprietary software was the first integrated system introduced (Singh, 2010:1); its programme source code is usually not available publicly compared to the open source (Webber & Peters (2010:7). It requires payment and license subscription for vendors to provide services. Comprehensive features and services such as "upgrade, backups, trouble shoot, technical functions, advice and training are delivered remotely". Koha, Evergreen, OPALS and ABC are examples of open source software. Proprietary software includes Millennium, Virtua, Adlib, among others. According to Breeding (2009a:20) open source could serve as alternative to the closed-source license arrangements. Can open source serve as a viable alternative for Anglophone West African libraries? Can open source software address the needs of the different category of libraries? What is the level of awareness? How prepared are African academic libraries for open source? This can be a study that can be investigated further.

Whilst the majority of public academic libraries in Ghana use proprietary ILS, the situation compared to other African countries like Kenya, Ethiopia and Nigeria is different. Some public academic libraries use open sources ILS especially Koha (Koha, 2014). Considering the choice made by some public libraries that have adopted open-source systems in the United States, use of Koha was found to be on the increase (Breeding 2009:20). In as much as some public academic

libraries in East and West Africa were supported by donors with grants to acquire proprietary systems (for example University of Ghana, Makerere and University of Education Winneba, using Millennium and Virtua respectively), open source could alternatively be a viable option since it also operates on international standards for ILS thus facilitating the use of MARC (Machine Readable Cataloguing) and the information retrieval interface standard, Z39.50.

3.4.2 Sequence of adoption

Yacob (2011: 8) and Kari & Baro's (2014:18) findings in Nigeria amongst others revealed cataloguing and classification activities, circulation and OPAC followed by serials and acquisition and budget services as modules activated. Thompson & Pwadura (2014: 66) affirm this by indicating that full automation of the cataloguing operations had been carried out at the University for Development Studies leaving other operations such as serials, circulation, acquisitions, amongst others. The Mortenson Center 2012 survey report (2013:54) on status of automation revealed that majority of the Carnegie Grantee Phase II libraries in West and East Africa had fully automated the cataloguing module. This brings up to date the findings of Rosenberg (2006: 290), Yacob (2011: 8) and Thompson & Pwadura (2014: 66), that the majority of sub-Saharan West African academic libraries commence automation with the cataloguing module.

This notwithstanding retrospective conversion, mentioned by Adanu (2006:104), Arkorful (2007:8), Egunjobi & Awoyemi (2012:12), has become necessary due to the fact that most academic libraries in Africa do not initiate automation at the early stage of library developments and have, consequently, significant collections requiring conversion from the card to electronic (Rosenberg, 2006:291, Egunjobi & Awoyemi 2012:12).

3.4.3 Information Communication Technology (ICT) and systems support

Most African researchers attribute socio-economic growth of a country to ICT developments (Holmner, Britz & Ponelis,2010: 2). Advanced ICT facilities, trained staff, user education programmes and e-services are considered essentials that aid library automation (Abubakar: 2011:3). Library automation heavily depends on hard and software hence cannot be functional without system support. This notwithstanding the hardware specifications, which ought to correspond to the software.

The choice of a particular ILS determines the "hardware to be purchased, the peripherals to use, backup plans, software upgrades, network and security support" (Webber & Peters, 2010:29)**.** This notwithstanding the provision of virtual and web base services via the internet. Though the liberalization of the internet has tremendously improved connectivity, there is still room for improvement since web-based integrated system requires constant internet supply. The influx of numerous internet providers has brought competition, expanded coverage and service quality. Sulemana (2015:17) reported on the fiber infrastructure in Ghana with the aim to bridge the digital divide between the urban and the rural areas by connecting to branch educational centers and remote data centers.

3.4.4 Cloud computing versus Client –server

According to Breeding (2009: 20), the days of client/server systems seems to be winding-down: rather, web-based cloud computing has become the growing phenomenon. Among the types of integrated library system is the Software-as-a-Service (SaaS) which is a web-based/cloud-based system that renders services remotely. Unlike the hosted system where the library hosts its server as well as control activities such as backups, upgrade, trouble shooting, maintenance, security and configuration, vendors of the SaaS rather control these activities remotely for the library in the cloud or web-based system. Cloud computing has in recent times become a viable alternative for libraries in advanced countries; on the contrary, the story in Africa is different. There seems to be limited awareness, and advocacy of it.

A major hallmark is the Online Computer Library Centre (OCLC) cloud computing where the computer is situated in a remote zone such that no one knows or cares where it is. The use of the cloud harnesses access to large union catalogues, facilitates sharing and addresses the problem of storage. Whilst developed countries have made headway in exploiting the cloud, developing countries according to Hopkinson (2009:12) recognize open source and cloud computing as the future of library automation. With regards to these developments, very little is seen on the part of the developing world, which includes Anglophone West Africa (Hopkinson (2009:12).

Cloud computing according to Wasike (2015:21) is recognized as emerging technology that facilitates sharing of hardware, software and other related service. It is also a "cost saving

mechanism, projects visibility, accessibility, controls duplication of effort, promote collaboration, addresses data storage manages resources and security". Wasike (2015:21) and Romero (2012:111) are of the view that the advent of cloud computing and services has called for the need for data security. Data stored internally or externally requires some level of security and control. .

3.4.5. Data Security versus backup

Data security and control have presently become a concern not only to businesses but libraries as well. Newby (2004:1) recommended the need for information security for libraries because libraries have made significant investments in computer-based resources, training and services. The security of data has become amongst others one of the features of the landscape (Wasike, 2015:21). The security of information according to Newby (2004:2) encompasses "information management, information privacy and data integrity". While data backup aims at storing data for access, data security aims to include "data confidentiality, integrity and availability". The reasons amongst others are that automation has called for the use of username and passwords, which are deemed sensitive.

Libraries make available information, software and computers for use by diverse patrons; this has exposed library systems to various vulnerabilities and threats. The modern-day library security goes beyond backup: rather it encompasses "data integrity, confidentiality and availability". "Unauthorized access, modification, snooping, cyber-attacks" amongst others are threats to library's hardware and software. These vulnerabilities are prone to many systems, which may affect automation strategies. The question is: to what extent are libraries, especially in Africa prepared to address this? In spite of remedies such as "firewall, encryption, authentication, backup, risk assessment, security policies and protection strategies, software and physical control" identified, there is the need for libraries to address this holistically (Webber & Peters, 2010:36).

3.4.6. RDA versus AACR2

According to OCLC (2015: about RDA), Resource Description and Access (RDA) has emerged as the new cataloging standard to replace the Anglo American Cataloguing Rule 2 (AACR2). It was introduced in July 2010 to allow for the creation and use of bibliographic data in an optimal manner by libraians.The advancement in Information Communication Technologies (ICT), the

digital era and information explosion in varying formats has called for the extensive description of bibliographic data.

Coyle & Hillmann (2007: 2) are of the view that as catalogue entries have become machine-readable records, there is the need to change such rules in order to accommodate technological changes and advancement. This will enable the "creation of innovative services, meet changing user behaviour, to accommodate the rapidly evolving information resources, shows relationship that exist among collection ,aids identification and retrieval of resources (Coyle & Hillmann,2007: 2). Application of RDA further promotes interconnection of metadata in the digital environment and navigation of bibliographic data (TILLETT, 2011:266). Whiles AACR2 is based on principles that is not seen according to TILLETT (2011:268), RDA entreats cataloguers to transcribe what they see. Also whilst RDA requires cataloguer's judgment to describe data as warranted, AARC2 give limited room for cataloguer's input but rather adherence to restrictions and rules. Though RDA has been adopted and in use by some libraries, it has not yet gained enough community support according to Coyle & Hillmann (2007:7).

3.4.7 Sustainability versus funding.

Arkorful (2007:3) commended the need for institutional budgets for academic libraries to embark on regular periodic maintenance and upgrade of library systems resulting from changes in technology. Findings have revealed that some funded academic libraries that were no longer funded have resorted to other sources of funding such as internally generated and national funding. This raises the question of sustainability. Only some donor partners, such as the Carnegie Corporation, renewed their grants in 2008 in order to build on key initiatives and ensure sustainability of the universities' accomplishments to promote global knowledge sharing. How then do academic libraries sustain these projects in the absence of donor support? Fuegi, Segbert-Elbert & Lipekaite (2011:149) recommended the need for libraries to increase collaboration with stakeholders who may positively influence, fund, and support libraries. Though funding is highly recognized, Imo & Igbo (2011:3) are of the view that the "selection of software, acquisition and maintenance" are some contributing factors that impact on sustainability.

Funding alone may not necessarily sustain the project: frequent upgrade, data security and backup, documentations are recommended. Selecting a suitable system that facilitates integration and migration is key. Libraries are noted for migrating from one system to the other, the question is what are the critical decision points to changing a system? What are the key elements to consider when one wants to migrate?

There is no doubt that certain developments and trends have accelerated automation in academic libraries. The change in technology has propelled a transition from the manual systems to automation, from client server to cloud computing, from backup to data security, AACR2 to RDA and from funding to sustainability. Academic libraries in Africa are exploring avenues to exploit open source as alternatives to proprietary software. Findings so far revealed some academic libraries which have adopted open source software. Though there has been a tremendous improvement over the past years due to the fact that certain private universities have made headway in the application of open source, public institutions may also need to champion these new developments via consortia bases.

3.5 Opportunities of academic library automation

Various publications reviewed for the last ten years have witnessed a rapid emergence of automated initiatives to promote access to library resources, especially on the African continent. Most universities in the sub-Saharan region have benefited from and enjoyed support to deliver automated services. The following success stories are collected from automated libraries.

3.5.1 Resource sharing
This has been identified as one of the enormous benefits of library automation especially in the academic environment. The automation of the University of Botswana Library enabled the sharing of resources such as bibliographic records and electronic resources with other cooperative networks (Mutula, 2012:300). This is corroborated by Stilwell & Hoskins (2013:14), Thompson & Pwadura, (2014:73) and Kargbo (2009:47) who indicate that automation has promoted the sharing of library materials through inter library loan (ILL), subscription cost, servers and ICT peripherals in the case of South Africa and Ghana. Academic library automation ensures the provision of library services remotely to patrons; it readily and economically makes available the needed information, promotes integrated services and further ensures standardization in sharing

and delivery of resources (Kavulya, 2007: 301). Eneya (2008:74) mentioned resources sharing and network facilities as a merit for multi campuses.

3.5.2 Increased Access

Increased access to library resources has been mentioned as one of the benefits of automation. Simultaneous access and multiple access to unlimited resources at the same time, varying formats and place are some of the privileges enjoyed by the Universities of Ghana, Sierra Leone, Nigeria, Malawi and Botswana. It has also impacted on the University of Development Studies Library by facilitating faster processing of materials to improve access. Stilwell & Hoskins (2013:11) indicated the advantage of seamless access to information due to the fact that automation supports variety of formats and facilitates access to diversity of resources. It offers good graphical user interfaces (GUI) such as video, voice, pictures etc. Further, automation facilitates wider coverage in information dissemination as experienced by University of Sierra Leone. Automating libraries increases web presence, facilitates access and addresses the varying preferences of patrons' information needs. Automation according to Wella (2011:67) projects the library's visibility on the web through the OPAC.

Facilitating access to an entire collection as one of the dual functions of the Gambia National Library Services Authority cannot be accomplished without automation; in spite of the privilege of collaboration between University of The Gambia and other libraries (Wally, 2010:2). Automation facilitates searchability and discoverability via the web. Most automated systems are web-based and this enables users to search a wide range of resources by same author with different titles, same titles with different authors, keyword search, subject search, advanced search, amongst others. Thompson & Pwadura (2014:73) and Egunjobi & Awoyemi (2012:12) indicated that online searchability enables patrons to search for the availability of materials remotely before coming to the library. This goes a long way to save the users' time. According to Mutula (2012:292) easy browsing via the web promotes user satisfaction as the use of card catalogue to locate and access collections usually consumes users' time. In this technologically advanced world, time has become a precious commodity for many and better use of time is what automation seeks to offer.

Wally (2010:1) indicated that the Gambia National Library Services Authority, which includes academic libraries, has the mandate to support education, culture and creativity. Therefore there is

no doubt that automation has to play a key role to facilitate access to the diverse collections. In addition to Kargbo's (2007:569) findings, library automation serves as one of the ways to enhance collection and management of local materials. Henceforth, Powel (2015:2) has recommended to African universities to employ information and communications technologies (ICT) specifically automation to improve access to research.

3.5.3 Efficiency and effective performance

Eneya (2008:74) mentioned controlled duplication of operations, introduction of new services such as "delivery of electronic information services, ask the librarian, email alerts on overdue and recall and instructions". There is also standardization of operational activities as a result of automation (Kavulya, 2007: 301). Among other things outlined are "improvement in efficiency, performance and better access to informational resources".

3.5.4. Librarians

Automation improves librarians' visibility, exposure to new skills and services and enhancement of their image. It improves collaboration as a result of introduction of new services. With reference to the above, the importance of academic library automation cannot be underestimated. African libraries in their quest to widen automation have set up consortia. Among them are the Consortium of Academic and Research Libraries in Ghana (CARLIGH), Nigerian University Libraries Consults (NULIB), Consortium of Uganda University Libraries (CUUL) and Consortium of Tanzania University Libraries (COTUL). It is envisaged that these national consortia will expand beyond the individual countries to sub-regional bases such as West, East, Central, and Southern Africa consortia to be able to gain the necessary bargaining power and to gain leverage capacity.

Library automation creates relationships among operations such as cataloguing, acquisition, circulation and serials .It controls repetition of operations as well as reduces cost involved in labour. It enhances job performance of academic librarians and their image. It promotes user satisfaction as a result of the introduction of new services. Automation enables the synchronization of other platforms such as social media, mobile applications, open scholarship, amongst others. Academic library automation cannot be taken for granted due to the fact that the opportunities derived span across national and international spheres.

3.6 Challenges of academic library automation

The following were identified as some of the challenges. They were categorized under the following:

3.6.1 Funding challenge

Though library automation offers fast, accurate and efficient access to diverse collections, it is expensive and cost intensive at the initial stage (Arkorful, 2007:2). Numerous researchers have identified inadequate funding as a major challenge to the majority of West African academic libraries. It was ascertained that most of those which adopted automation depended on external funding partners. Among them was the University of Education Winneba Library. The same was stated by Thompson & Pwadura (2014:73), Egunjobi & Awoyemi (2012:14) and Kargbo (2009:47,48), that inadequate funds coupled with high maintenance cost impeded the automation project of the University for Development Studies, Nigerian universities and University of Sierra Leone respectively.

Studies have revealed that African libraries rarely integrate automation at the initial stages of library development. By so doing, the majority are yet to successfully and fully automate their services due to inadequate funding (Mutula, 2012:292). Poor economies of scale coupled with shortage of foreign exchange for maintenance and systems upgrade have been mentioned by Hopkinson (2009:5).

3.6.2 Frequent power outages

Hopkinson's (2009:10) survey revealed poor usage statistics of the OPAC by students in Nigeria as a result of frequent power outages. It has been acclaimed by Nkanu &Itohowo (2010:10), Thompson & Pwadura (2014: 73) Chinwe, Anunobi & Ezeani, (2011:384) that frequent power outages are mostly experienced in Ghana and Nigeria. Kargbo (2009:49) pointed to frequent blackouts in Sierra Leone as well. Inadequate power supply usually brings work to a standstill. Load shedding and frequent power fluctuation lead to breakdown of equipment and loss of data. The above point to the fact that erratic power supply is prevalent in West Africa as compared to the South.

3.6.3 Internet connectivity challenge/ Infrastructural Gap

Mutula's (2008:280) article commenting on the digital divide and economic development in sub-Saharan Africa indicated the inadequate fiber optic cable system in Eastern and Southern Africa. Bandwidth bottlenecks, hardware and software problems pointed by Kesselman et al., (2013:7) as well as Kargbo (2009:48) serve as barriers to successful library automation in West Africa. Though developments and initiatives to boost internet connectivity across the region have taken place -- Central African Backbone (CAB), Africa Broadband Network (EABN), South Africa Region Backbone –(SATA) West Africa Network – ECOWAN and ECOWAS Power Pool-based Fiber Network -- among others (African Development Bank Group, 2014: Network); resource sharing among sub-Saharan African academic libraries could improve if internet access is improved and adequately addressed among the various sub regions. This, notwithstanding, the submarine (Uhurunet) and terrestrial (Umojanet) cable systems by NEPAD (2014: Internet).

Though these initiatives may address internet challenges in those regions in the near future, the problem will probably persist since Mutula (2012:302) mentioned that students still experience access problems from home because of inadequate connectivity, or inability to properly log on remotely; this therefore undermines the idea of automation. Further, inadequate bandwidth and poor connectivity have been mentioned by Thompson & Pwadura (2014:73), Chinwe, Anunobi & Ezeani, (2011:382) and Kargbo (2009:48) in their studies. Despite the developments, internet connectivity remain a challenge to be addressed in West Africa.

3.6.4 Hardware and software

"Inadequate computers to facilitate access, absence of policy to regulate standards in ICT installations, inadequate provision of ICT facilities for libraries, absence of knowledge of ICT, implementation policies as well as hardware and software obsolescence" have been pointed by Nkanu & Itohowo (2010:10) and Rosenberg (2006:291). Further, "lack of robust computers, frequent software upgrade and power outages" hinder the University of Cape Coast Digital Library in Ghana (Adzobu, 2014: 40). This is in consistent with the situation in Nigeria. One of the challenges identified by the majority of West African authors, including Eneya (2008: 77) from Malawi, is the frequent upgrade of automated systems. After payment has been made, annual subscription fees, upgrading software from one version to the other has to be considered a priority.

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3.6.5. Staffing/ training

Rosenberg (2006:291) mentioned lack of, or inability to retain trained library staff as a challenge for the majority of libraries in Africa. The intensity and impact of this challenge is compared to that of lack of funding. Kargbo (2007:567) affirms this by pointing to the brain drain which has resulted in the majority of libraries being run by para-professional staff in Sierra Leone. Inadequate IT staff to handle projects, thus systems librarians, lack of project management skills on the part of librarians to manage automation as projects, computer phobia, attitudinal problems, poor ICT skills on the part of some librarians, high staff turnover, amongst others affect the maintenance and continuity of library automation projects (Stilwell & Hoskins 2013: 14, Adzobu, 2014:4; Thompson & Pwadura 2014:73; Kargbo 2009:48; Arkorful, 2007:9; Wella 2011:66; Chinwe, Anunobi & Ezeani, 2011:384 and Amekuedee, 2005:442). Lamptey & Agyen (2010:67) indicated the low level of ICT skills among some librarians which was also pointed out by Amekuedee (2005:449) some years back.

3.6.6 Bureaucracy.

According to Chinwe, Anunobi & Ezeani (2011:382), the implementation of technology and innovation require prompt decisions and immediate action: the absence of this decision-making structure delays projects. Hopkinson (2009:5) identified bureaucracy that existed in collaborating with and among institutions to get library automation project off the ground as a potential source of hindrance. The initial stages of an automation project needs a thorough understanding by all stakeholders involved in order to take off successfully. This is sometimes delayed. In addition to this are the procurement practices, which can contribute to delay in automation projects (Arkorful, (2007:10). The issue of bureaucracy pointed by Chinwe, Anunobi & Ezeani (2011:382) could be overcome if the automation process is disaggregated into project phases.

3.6.6 Retrospective conversion

According to Abdussalam & Saliu (2014:20)) retrospective conversion poses a challenge to the automation of libraries in Africa and contributes to the delay in most projects. The conversion of a print catalogue to a digital record is time consuming and labour intensive (Boateng, Agyen & Dzandu 2014:17).

Numerous challenges have been identified as barriers to academic library automation in Africa. Amongst them are inadequate funding, technological obsolescence, poor policy guidance, bureaucracy, staffing and training, internet connectivity challenge, frequent power outages, amongst others. In as much as open source software has been identified as less costly, technical expertise is required to be able to modify the programme code and to customize it to suit a library. The question is: how could the problem of expertise be addressed to maximize open source facilities?

Literature findings: Table 2
The table below gives a summary of the opportunities, challenges and recommendations experienced by the various academic libraries.

Study Reference	Study Design	Opportunities	Challenges	Recommendations
Kari & Baro (2014:15, 17)	use of library software in Nigerian University Libraries and challenges	• Increased access to information • sharing resources • customizability • saves time	• lack of technical guidance • Lack of feasibility studies • Erratic power, • Inadequate professional Librarians to support projects • Choice of software	• open access • provision of power • capacity building in ICT • Thorough evaluation of software before purchase. • Collaboration and partnership
Boateng, Agyen & Dzandu (2014:14, 17)	Pros and cons of automation : case of KNUST	• speedy transaction • increased accessibility	• Retrospective cataloguing of backlog • power fluctuations • inadequate IT training	• Staff acquire training in IT • Outsources of service to expertise
Eneya (2008:74, 75, 77, 83)	University of Malawi Library automation	• Control repetition of operation • Enhance resource sharing	• High cost of software(ILS) • Frequent upgrade	• open source systems • Reckon automation as a project

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			• Frequent power failures • inadequate systems librarians	• Capacity building of librarians in computer skills • Adherence to hardware and software specifications
Stilwell & Hoskins. (2013:11, 13, 14, 15, 16)	Integrated library management systems: choices and sustainablity in South Africa	• Seamless access to information, • Good system for usage reports and statistics • Facilitate searchability and discoverability via the web • Offer graphical user interfaces (GUI) • Promote resource sharing (cost, peripherals, servers) • Support variety of formats	• Escalating costs of upgrades and maintenance • Inadequate technical expertise	• Provision of training • Subscription of ILS through consortia base to minimize cost (11)
Ogunsola & Okusaga (2008: 47, 49, 50)	Virtual Libraries in African Universities: Problems and Prospects	• Possibility of resource sharing • Fast and convenient service • Freeing of physical space	• Frequent power cut • Telecommunication challenge • Funding	• Open source software • collaboration with international community for support • increased internet access
Wally 2010:2	Gambia National Library	• Facilitate access • Increased collaboration among libraries	• Power supply challenge	• Increase Power supply

	Services Authority	• Promote efficiency		
Rosenberg (2006: 290, 291, 292, 293	Towards the digital library in Africa	• Increased access to electronic resources	• Inadequate library management systems • lack of retention of trained library staff • poor funding	• Provision of library management systems • Revamp of professional librarianship education and training schools' curricula • Continued support from funding agencies • Increased library budget
Lamptey & Agyen (2010: 67)	Future of academic libraries in Ghana	• Access to information improved	• low level of ICT skills among Librarians	• Capacity building of academic librarians
Thompson & Pwadura (2014: 73, 76)	Library automation :University of Development Studies	• Faster processing of materials to increased access • Facilitates remote access of resources • Online Searchability • Sharing of resources	• Frequent Power Outages • High cost of maintenance • Lack of Technical Skills and expertise	• Provision of IT infrastructure • Capacity building and training in ICT
Wella (2011: 66).	Library automation :Case study University of Malawi	• Improve sharing of resources	• Lack of Funds • Lack of teamwork affect continuity of projects • Poor project management skills	• Librarians acquire project management skills • Team work

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				• Proper documentation
Egunjobi & Awoyemi (2012: 12, 13, 14)	Library automation with Koha	• Easy access to and retrieval of information • Conserve space • Saves time of patrons	• Inadequate power supply • Low IT skills of staff • Procurement of accessories challenge	• Open source software(saves cost) • Needs assessment needs to be carried out before choosing appropriate software • Automation should be reckoned as a project • Constant power supply • Availability of Systems librarians • Commitment from management • Acquisition of IT skills prior to implementation
Chinwe, Anunobi & Ezeani, (2011:384)	Digital library deployment in a University ,Library	• Increased Access to electronic resources	• Lack of skilled personnel • High cost of upgrade • Power outages	• Training • Provision of funds
Yacob (2011: 3, 5)	Academic libraries in Southwestern Nigeria,	• Increased Resource sharing • Increased efficiency • Automation enhance the job	• Low level of ICT skills; • lack of functional ICT policy; • economic barriers (funds)	• adequate training in the use of ICT • provision of ICT Policy and plan

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		performance of academic librarians • timely provision of information to lecturers, researchers and students	• lack of commitment from institutional managers	• commitment from institutional managers
Mutula (2012: 292)	Library automation :case study of University of Botswana	• Increased access to diversity of resources • Enhanced image of Librarians • Freeing of library physical space • Introduction of new services • User satisfaction • Access to local content enhanced. • Delivery of electronic information services	• High cost of system subscription • Bandwidth bottlenecks • Inadequate electricity supply • Low ICT skills level of some librarians • Procurement challenge	• Extensive consultation with stakeholders • Capacity building for librarians • Integration of strategic goals of the institution automation projects • Consortia building
Kesselman al et (2013: 9, 7)	Community Knowledge Centers for Liberia	• Increased access • Use of information on mobile devices	• Internet challenge • Lack of trained staff • Erratic power supply	• Provision of internet • Adequate power supply • Collaboration and partnership • Open source
Kargbo, (2007: 569)	Libraries and local history collections in Sierra Leone	• enhance collection and management of local history materials	• inadequate funding • Brain drain	• provision of funds • retention of staff

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Kargbo, J. A. A. (2009: 47, 48, 49).	automation :whither academic libraries	• Liberation of floor space • Better inventory control methods • Management of library routines • Cost effective • Global networking • Averts duplication of work • Resource sharing • Wider coverage in information dissemination • Librarians image enhanced	• Inadequate systems librarians and poor ICT skills of librarians • Frequent Blackouts • Bandwidth problems • Resistance on the part of some librarians to change • High staff turn over	• Team work • Capacity building for librarians • In-depth consultation • Consortia and cooperative formation • Collaboration with stakeholders such as faculty, donors, expert, finance • Awareness creation among library staff and stakeholders in order to gain ful support
Arkorful (2007:1, 2, 9)	Online Catalogues in African Academic Libraries	• Promote effective information delivery • Enhanced resource sharing • Facilitate remote access to enormous information	• Lack of systems librarians • Delay due to procurement laws • Irregular power supply	• Adherence to automation standards • Partnership • Establishment of consortia • Selection of robust and tested LMS
Hopkinson (2009:5, 6)	Library automation in developing countries: the last 25 years	• Projection of the library catalogue on the web • Facilitate access	• High cost of ILS • power supply problem • inadequate training • low bandwidth	• use and application of open source software • consortia formation to harness training

Nkanu and Itohowo (2010:4, 5)	Bridging the Gap through ICT in Nigerian Libraries	• Facilitate global access • resource sharing and exchange of information • access in different formats • inter-library cooperation	• inadequate provision of funds • Poor electricity supply • Absence of ICT training programmes • Absence of policy to regulate standards in ICT installations	• librarians need education which is ICT-based • Improvement of connectivity • appropriate electric power supply • provision of ICT policy guidelines
Kargbo (2005: 150)	Promotion of grey literature in academic libraries in Sierra Leone	• facilitate access to grey literature	• inadequate funds • Lack of ICT technologies	• provision of funding • Training of librarians on ICT
Palumbo L.B. (2012: 8)	creating a prototype engineering library using XTF at the University of Liberia	• Automation facilitates the use of mobile devices • Access to variety of formats • Facilitate navigation capabilities • customization	• Limited internet access • Inadequate infrastructure •	• Open sources • Use of offline automation system such as XTF • Use of mobile applications • Provision of internet

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3.7 Summary

Academic libraries in Africa have taken on a new phase as a result of the changing needs of patrons. Information technology applications reckoned formally as threats to library's survival have become an encompassing tool used to harness access to library resources. This chapter reviewed related works on the opportunities and challenges experienced by some academic libraries. The following thematic areas were reviewed: role of academic library automation in sub-Sahara Africa, academic libraries automation profile, current trends and developments in academic library automation, opportunities and challenges of academic library automation.

CHAPTER FOUR

RESEARCH FINDINGS, DISCUSSION AND INTERPRETATION

4.1 INTRODUCTION

This chapter presents the analysis and findings of the study thus 'opportunities and challenges of automation experienced by some academic libraries in Anglophone West Africa'. It presented findings from both literature and empirical data by triangulation and analysis to ascertain whether the same elements were present in all libraries. Questionnaires and systematic literature review methods of data collection were used to solicit views from senior academic librarians and from the literature respectively. The University of Ghana (UG), the University of Education Winneba (UEW), the University of Cape Coast (UCC), the Kwame Nkrumah University of Science and Technology (KNUST) and the University for Development Studies (UDS) were the units used for the primary data. There was a 100% response rate, signifying the level of willingness and enthusiasm accorded to the study.

This session highlighted the findings discovered by looking at the research questions listed in chapter one:

- What role does automation play in academic libraries in sub-Sahara Africa?
- What profile has academic library automation?
- What are the current trends and the development in the automation environment?
- Are there opportunities for academic library automation?
- What are the challenges to academic library automation in sub-Sahara Africa?
- Are there appropriate recommendations to address those challenges?

4.2. AUTOMATION'S ROLE IN ACADEMIC LIBRARIES IN SUB-SAHARA AFRICA

Like in other continents, automation plays a role in academic libraries in sub-Sahara Africa. Reviewing this, respondents were asked about their satisfaction with the automated system in use:

the majority, representing eighty percent (80%), indicated that they were satisfied with the systems. Further questions asked to ascertain the reasons associated with the satisfaction of the system were: "increased access to resources, effective performance of the operations of the library such as acquisitions, original cataloguing, copy cataloguing, serials, circulation of the library materials, registering of library clients and compilation of reports in a relationship manner". It was also revealed that automation enhanced resource sharing among libraries through the use of the Online Public Access Catalogue (OPAC). One can view the holdings of other libraries remotely, thereby facilitating Inter Library Loan (ILL) services. This, notwithstanding synchronization with other platforms such as Learning Management Systems (LMS), digitised resources and repositories, amongst others. The above corroborated the findings of Abubakar (2011:2) that automation enabled academic libraries to serve a global as well as a locally dispersed clientele.

Additionally, the University of Education Winneba (UEW) and the University of Ghana (UG) experienced efficient service due to timely processing of materials. This affirmed Wally's research (2010:2) in Gambia, Yacob (2011:3) in Nigeria and Kargbo (2009:48) in Sierra Leone. It also corroborated what was said by Eneya (2008:77) and Mutula (2012:292) in Eastern and Southern Africa. Developing nations, according to Hopkinson (2009:3), could reduce management cost on acquisition and labour since automation is less labour intensive. It is expected that patrons serve themselves both in the library and outside the library.

4.3. PROFILE OF ACADEMIC LIBRARY AUTOMATION
The following thematic areas were looked at in profiling academic library automation.

4.3.1 Awareness of library automation
The majority of academic libraries in Anglophone West Africa were found to be familiar with automation. Synonyms such as virtual libraries, digital and automated libraries were noticed. These descriptions were used interchangeably, testifying to the fact that automation has become popular among them. With reference to the above, automation was clearly defined as the use of an automated system, such as an integrated library system, to perform the operations of the library. The majority of respondents were found to be aware of the use of such since the use of computers and availability of electronic resources alone may not necessarily mean automation.

4.3.2 Automated System in use

It was revealed that both proprietary and open source automated systems were known to the librarians. Among them were the Virtual Library System, Sierra, Alexandria and Koha integrated systems by the University of Education Winneba, the University of Ghana, the University of Development Studies, KNUST and the University of Cape Coast respectively. In as much as the majority, eighty percent (80%), seemed to use proprietary systems, the University of Cape Coast has taken a different approach by operationalizing the cataloguing, circulation and the OPAC modules with the open source Koha integrated system. This finding agreed with earlier findings on open source software, specifically Koha, used by Adeyemi College of Education Library, the Ilorin Library, the Bowen and Redeemers Library in Nigeria to perform the activities of cataloguing, OPAC, circulation & serials (Egunjobi & Awoyemi, 2012:12; Abdussalam & Saliu 2014:15; Ogbenege & Adetimirin, 2013:17). These confirmed the conclusions of Kari & Baro (2014:17) that of those university libraries in Nigeria using open source software, the majority are using the Koha system.

It was discovered that most academic libraries in Ghana used the proprietary ILS compared to the open source used in Nigeria. In as much as the University of Cape Coast had succeeded with the Koha ILS, it is envisaged to serve as a yardstick and benchmark for other academic libraries to emulate. The use of open source software for automation is gradually being exploited among Anglophone West African libraries. This rightly brings to light an investigation on the adoption rate of open source software as against proprietary among the resultant countries.

Table 3: Automated system in use

Academic Library Institution	Automated system used
University for Development Studies (UDS)	Alexandria
University of Cape Coast (UCC)	Koha
University of Ghana (UG)	Sierra

| Kwame Nkrumah University of Science Technology | Alexandria |
| University of Education Winneba (UEW) | Virtua |

Source: Field Survey 2015

4.3.3 Sequence of adoptions

Findings revealed the various operations of the library that had been automated. Among them was the cataloguing module, representing 100%. This indicated that all the libraries have at least operationalized this activity. This was followed by the online public catalogue and circulation, representing 80% respectively. Acquisitions and serials modules represented 40% each. The above reinforced the results of a number of publications in the literature reviewed, including Kari & Baro (2014:18), that acquisition and serials are usually the modules least activated due to disparities in accounting systems. This affirmed the assertion that the majority of academic libraries in Anglophone West Africa have initiated automation projects at different stages.

Table 4: Automated library activities

Modules Activated	Rating %	
	Yes	**No**
Cataloguing	100	
Acquisition	40	60
OPAC	80	20
Circulation	80	20
Serial	40	60
Reporting	100	
other		

Source: Field Survey 2015

4.3.4 Resources for library automation projects

Respondents were asked about the kinds of support available in their institutions for library automation projects, in order of importance. Technical support and capacity building were found to be available in all the five academic libraries. Technical support was tagged to be of highest importance with 80% response rate.

Financial support was available in the majority of the libraries surveyed. Eighty percent (80%) indicated that it was very important. A number of academic institutions recently seem to appreciate the role and opportunities of automation hence the availability of funds to support such. Evidence of local, national and international funds such as Academic Facility User Fees (AFUF), Educational Trust Funds, among others, allocate funds to support the library (Arkorful, 2007:3).

Capacity building was perceived to be very important due to the evolving nature of technology. The changing nature of technology requires assessment of needs and gaps before embarking on such initiatives.

Sixty percent (60%) infrastructural support was also found to be available in three of the libraries surveyed.

Table 5 Available resources for automation and their importance.

Support	Available %		Importance? %				
	Yes	No	Not important	Limited importance	Important but not vital	Very important	Highest importance
Technical	100					20	80
Financial	80	20			20	80	
Capacity-building	100				40	40	20
Infrastructure	60	40		20		20	60

other							

Source: Field Survey 2015

4.3.4 Sources of support and availability

Further to the above, the researcher wanted to know about the availability of the sources of support for automation projects. The majority of respondents indicated internal sources of support. Indications below showed that majority of the libraries relied on internal sources as the available (60%) and most available (20%) forms of support. This was an improvement over previous findings where the majority of academic libraries who initiated automation projects depended totally on external support. The above indication justifies the statements about the considerable benefits experienced by faculty, students, administrators and librarians on academic library automation, hence advancement in internal support. Other sources of support were the national government and consortia. Academic library automation more or less is recognized as a criterion for accreditation purposes. National Accreditation Board (NAB) Ghana and National University Commission (NUC) Nigeria recognise that as such (NAB, 2013:6 and Omopupa & Abdulraheem, 2013:45).

Table 6: Sources of support and availability

Sources of support	Availability			
Support	**Non availability**	**Least available**	**Available**	**Most available**
External	20	20	40	20
Internal	20		60	20
Government		60	20	20
Consortia		80	20	

other				

Source: Field Survey 2015

4.4 CURRENT TRENDS AND DEVELOPMENTS IN THE AUTOMATION ENVIRONMENT

The researcher explored the perceived importance of these aspects of developments in library automation environments. The following responses were given: all respondents agreed on the adoption of open source software as a development. The University of Cape Coast and academic libraries in Nigeria and Liberia used Koha and XTF open source software for automation purposes. Eighty percent (80%) of the respondents agreed with the fact that automation ought to be managed on a project basis, hence the need for project management skills. This notwithstanding, the application of critical success factors (CSF) seen as a viable project application tool. Forty percent (40%) agreed to the use of Discovery as a search tool, whilst forty percent (40%) attested to iCloud /cloud computing as a development tool. This attests to the fact that there is a growing base for Discovery and Cloud computing, but not for complete adoption.

In as much as some libraries in the developed world have considered cloud computing (Breeding, 2009: 20), academic libraries in Anglophone Western Africa are yet to explore it. There is therefore the need for awareness creation among librarians. All the respondents responded in the affirmative to the concept of the consortia as one of the developmental paths. Sixty (60%) and forty percent (40%) strongly agreed and agreed on collaboration with stakeholders. The majority attested to the need for assessment before embarking on automation project. Building the capacity of librarians especially in ICT was considered crucial, thus 40% strongly agreed, whilst 40% agreed. Team work was regarded as an important development. Working in teams was crucial as indicated. It was discovered that the majority of the librarians did not seem to know much about data security. Sixty percent (60%) remained neutral on this. Gamification, integration of social media tools and mobile applications were developments found to be least exploited by Anglophone West African librarians for automation purposes.

Concerning project sustainability, librarians were seen to explore alternatives to sustain library automation projects. The majority, sixty (60%) strongly agreed to this. How could libraries sustain automation projects? Mchombu & Beukes-Amiss (2015: 122) raised a concern about the need for advanced skills in fundraising and resource mobilization. Further, libraries, according to Opoku-Mensah (2015:4), should perhaps consider investments as an alternative source of sustenance. This, according to her, could be achieved when libraries "Re-profile, Reposition and Restructure" themselves to meet the needs of their clients.

Re-profiling highlights a new set of skills and the development of leadership roles. Repositioning involved application of innovative services and collaboration with other stakeholders such as businesses, historians and science scholars. Restructuring encompasses re-organization of the businesses of libraries, re-tooling, repackaging information, application of metrics to measure improvement and identifying gaps in the business economies in order to impact on those. In as much as the academic library is a nonprofit making organization, its sustainability could be achieved when libraries embrace 'new skills, technology and innovations', Examples are gaming, iCloud, photos, music and multimedia platforms. The concept of 'Librii' which is intended to provide library networked services along fiber-optic lines, the first of its kind in sub-Saharan Africa, is an interesting example. This is a US based startup that has rethought what a library could be (Zhou, 2015:1).

Table 7: Trends and developments in automation

Trends and Developments	Rating%				
Developments	Strongly agree	Agree	Neutral	Disagrees	Strongly Disagree
Free Open source software	20	80			
Automation as project	20	80			

Discovery		40	60		
ICloud /cloud computing		40	60		
Consortia/ cooperation	60	40			
Collaboration and consultation with stakeholders	60	40			
Needs Assessment	20	60	20		
Capacity building	40	40	20		
Team work	60	40			
Data security	20	20	60		
Sustainability	60	20	20		
Gamification	20		80		
Social media applications	40		60		
Mobile devices	40		60		
Other (specify)					

Source: Field Survey 2015

4.4 PREVAILING OPPORTUNITIES

On assessing the potential benefits of academic library automation, the following responses were retrieved: all the librarians indicated that automation increased access to the diversity of resources simultaneously. Keyword search, basic search, author search, subject search and advanced search aid information retrieval. There was wider coverage on information dissemination as a result of increased web visibility. This was also the experience of Kargbo (2009:47) and Palumbo (2012:8) in Sierra Leone and Liberia.

Resource sharing was mentioned as a major impact of library automation. Forty percent (40%) of respondents strongly agreed whilst 60% agreed to that. This were affirmed by Mutula (2012: 300), Stilwell & Hoskins (2013:14), Thompson & Pwadura (2014:73), Kargbo (2009:47) and Wella (2011:66). Efficiency and effective performance was discovered to be indispensable, resulting from control of duplication of activities. Forty percent (40%) of the respondents strongly agreed to that, whilst 60% agreed. It was discovered that the majority had not explored the system's ability to process local content such as dissertations and thesis. Only 40% agreed to that, whilst 40% disagreed. Though Kargbo (2005:150) in Sierra Leone attested to this, only a few librarians confirmed it, as at the time of this study.

On the question of increased collaboration among libraries such as lnter-Library Loan (ILL) services, the majority attested to its importance. Forty percent (40%) strongly agreed whilst 60% agreed to that. This was followed by freeing of physical space. Forty percent (40%) of the respondents strongly agreed whilst sixty percent (60%) agreed; this corroborated Egunjobi & Awoyemi (2012:12) .Report of the Carnegie Grantee Libraries in the Eastern and Western Africa indicated that such free spaces were being used as learning commons for post graduates students and researchers (Mortenson Center, 2013:11). Most of the respondents attested to the fact that automation elevated the image of librarians, 40% strongly agreed to that whilst 60% agreed on that. This affirmed what Kargbo (2009:47) in Sierra Leone, and Mutula (2012:292) in Botswana, discovered.

Again, fast and convenient services were also mentioned as some of the benefits of academic library automation. Considering the different category of patrons against the varying formats, circulation particularly created the needed synergy between patrons and materials. Sixty percent (60%) of respondents strongly agreed to that whilst 40% agreed on that. Boateng, Agyen & Dzandu (2014:14) and Ogunsola & Okusaga (2008: 47) affirmed the importance of speedy transactions with automated services. It was also confirmed that automation facilitated the generation of usage statistics and reports that aid in decision making. Forty percent (40%) of librarians strongly attested to that, whilst 60% agreed. Chisenga (2006:1), in assessing the role of automation in the Eastern, Central and Southern Africa, indicated inter library loan, efficiency and sharing of resources as some of the benefits.

Table 8: Opportunities of library automation

Benefits of automation	Rating%				
Benefits	Strongly agree	Agree	Neutral	Disagrees	Strongly Disagree
Increasing access to library resources	100				
Resource sharing	40	60			
Efficient and effective performance (duplication control)	40	60			
Easy processing of local content (dissertation, thesis, eTD)		40	20	40	
Increasing collaboration among libraries (lnter Library Loan)	40	60			
Freeing of physical space	40	60			
Improving the image of librarians	40	60			
Increased visibility on the web		60	40		
Fast and convenient services	60	40			
Usage reports and statistics	40	60			
Other (specify)					

Source: Field Survey 2015

4.5 CHALLENGES EXPERIENCED

Information communication technology (ICT) with its associated expertise has been a major backbone to library automation. Inadequate technical expertise was mentioned as one of the major challenges to academic library automation among Anglophone Countries in West Africa, this exacerbated by lack of retention of trained library staff and high staff turnover. All the five librarians that attested to this daunting challenge strongly agreed. Inadequate IT support, be it in logistics, system specifications, infrastructure, expertise, high cost of software, or frequent upgrades, amongst others, were discovered to be a hindrance to automation projects.

Poor internet connectivity was vehemently confirmed by 80% of librarians, whilst 20% agreed on that. Kargbo (2009: 48) and Palumbo (2012:8) have also alluded to this in Sierra Leone and Liberia. One of the purposes of automation is to widen access to information both on site and off site: considering the fact that the majority of the automated systems were web-based, the absence of internet connectivity defeats this purpose. Both librarians and patrons need internet to be able to download or upload records.

A poor and inadequate power supply was indicated by all the respondents (100%). An erratic power supply continued to impede automation projects in Nigeria (Nkanu & Itohowo 2010:5; Kari and Baro 2014:18). The same issues have been mentioned by Kargbo (2009: 48) in Sierra Leone, Wally (2010:2) in Gambia and Kesselman et al., (2013:7) in Liberia. The issue of erratic power supply seems to be experienced by the majority of Anglophone West Africa academic libraries, hence it is impact on automation. The question is how can this challenge be addressed? The absence of power usually makes it impossible to work with or use the automated system. Inadequate power infrastructure and expertise have overtaken funding as the major challenge for automation. Sixty percent (60%) of the respondents disagreed on the fact that funds poses a challenge, whilst forty (40%) agreed to that. This affirmed the assertion that the majority of the libraries were being supported internally, upon exploring the opportunities accrued to automation. Further the penetration of open source has positively impacted on this issue.

Earlier findings revealed the need for capacity building and the importance of this. There seems to be many capacity building opportunities, yet inadequate expertise was often mentioned. Identifying the needed skills in order to address them seemed to be lacking, hence the challenge of skills gap. Conducting needs assessment of the available skills to identify gaps ought to be appropriately considered.

Eighty percent (80%) of the librarians strongly agreed on poor cooperation and support. Collaboration and cooperation among librarians are envisaged to promote vibrant consortia. Asamoah–Hassan (2008:10), though, commended the use of the consortial approach to consolidate gains on "automated system, expertise, shared resources" amongst others. The majority of the respondents attested to poor cooperation and support as challenges.

The challenge of team work was also identified. The adoption and implementation of academic library automation does not take place in isolation but rather in a broad organizational environment. Interrelated units such as finance, the IT unit, the procurement and logistics team, faculty, stakeholders, amongst others, play a role. In such cases, shared decision-making and team work is required. Sixty percent (60%) of librarians strongly agreed to this whilst forty (40%) agreed, upon recognizing the role of team work in automation projects. According to Wella (2011:66) lack of teamwork affects continuity of automation projects in Africa. Schwalbe (2009:23, 51) also acknowledged this, that involvement of users and stakeholders is considered a key to the success of ICT projects.

Lack of computers to explore the OPAC, as well as perform the activities of cataloguing, circulation, serials and acquisition were identified. The absence of computers was strongly confirmed by sixty (60%) librarians and forty (40%) agreeing to that. Non-availability of ICT infrastructure, which included computers and accessories, was alluded to by Opoku-Mensah (2015:2), as well.

Poor project management skills was vehemently raised by a librarian who deemed it necessary for library automation projects, whilst the majority of the librarians agreed. The absence of these skills mostly hinders the completion of automation projects on time, budget and specification. The awareness of this has not gained much recognition yet. Mortenson Center for International Library Program's (2013:12) report on Carnegie Grantee Libraries in the Eastern and Western Africa were

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equipped with project management skill before they embarked on the academic library automation projects.

Table 9 Challenges to academic library automation

Challenges to Automation	Rating %				
Challenges	**Strongly agree**	**Agree**	**Neutr al**	**Disagre es**	**Strongly Disagree**
Poor internet connectivity	80	20			
Inadequate technical expertise	100				
Inadequate funds		40		60	
Inadequate capacity building	60	40			
Lack of computers	60	40			
Poor corporation and support	80	20			
Inadequate IT support	100				
Lack of team work	60	40			
Poor and inadequate power supply	100				
Errors in data entry	20	20	60		
Inadequate project management skills	20	80			

Source: Field Survey 2015

4.6: RECOMMENDATIONS TO MANAGE CHALLENGES

The following were recommended as some of the solutions to address the challenges identified. To address the challenge of inadequate expertise, all the librarians alluded to training and

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availability of systems librarians to step in and fill the gap. The majority of the literature surveyed alluded to this as well; amongst them were Thompson and Pwadura (2014:73), Kargbo (2009:49), Kari & Baro (2014:18). Amongst the effort to address this challenge is the building of capacity of librarians by the University of Pretoria through the Carnegie Funding Programmes: Master of Information Technology (MIT) and the Career Development Programmes (CDP) to equip librarians from Ghana, Nigeria, Tanzania, Uganda, Kenya, and South Africa with the needed ICT skills. Also, there is the need to retain trained library staff on the job.

Building the capacity of librarians by training library staff on the use of automated systems is key. The majority of the respondents recommended the need for this, especially in ICT training. This corroborates the International Federation of Library Associations and Institutions, IFLA (2012:5) guidelines for professional library/ information educational programmes curricula to embed application of information and communication technologies to all the facets of library and information curricula.

Increased collaboration and consortia formation was recommended by all the five librarians. The use of the consortia, collaborations and consultation among colleagues according to Kargbo (2009: 49) in Sierra Leone, Mutula (2012:292) in Botswana, Ogbenege & Adetimirin (2013:15) in Nigeria and Stilwell & Hoskins (2013:16) in South Africa were viable.

Improvement in internet connectivity was strongly recommended by all the five librarians. This showed the extent by which this challenge needs to be addressed. The provision of adequate internet were recommended by Nkanu & Itohowo (2010:5) in Nigeria and Palumbo (2012:8) in Liberia as well.

The provision of adequate power supply was raised by all the five librarians. This showed the impact of this challenge on library automation. The absence of electricity brings work to a halt for both librarians and patrons. This has been confirmed by Abdussalam & Saliu (2014:18) in Nigeria, Wally (2010:2) in Gambia and Kesselman et al., (2013:7) in Liberia. This points to the fact that the majority of countries covered, that is, Ghana, Nigeria, Gambia, Sierra Leone and Liberia, experience power crises.

There was no doubt that one of the factors that led to the successful implementation of the Carnegie Grantee Libraries in Eastern and Western Africa was project management skills (Mortenson Center for International Library Programs. 2013:12). Acquisition of project management skills mentioned by Egunjobi & Awoyemi (2012: 14) and advanced ICT skills prior to implementation according to Kargbo (2009:49) was commended. This seems not to have gained the needed awareness among the librarians. Among the five librarians, only one acknowledged the need for this skill.

The provision of adequate funding was recommended by 40% of librarians; this insinuated that automation seems to gain the needed support by the majority of academic institutions internally.

Table 10 Recommendations to address the automation challenges

Recommendations to academic library automation	Rating%				
Recommendations	**Strongly agree**	**Agrees**	**Neutral**	**Disagree**	**Strongly Disagree**
Capacity building enhanced	80	20			
Increased collaboration and consortia	100				
Provision of adequate funding	40	40		20	
Provision of robust computers					
Librarians trained in the use of ILS	60	40			
Advanced knowledge in ICT	80	20			
Availability of systems librarians	100				
Provision of adequate power supply	100				
Improvement in internet connectivity	100				

Application of project management skills	20		80		

Source: Field Survey 2015

4.7 SUMMARY OF FINDINGS

Like academic libraries in other parts of the world, Anglophone Western African libraries have experienced opportunities accruing from automation. Academic library automation has impacted on the academic sphere, especially in the Western African academic community. There is no doubt that the advertisement of automation systems has impacted libraries by underlining the opportunities of extensive access to informational resources, shared resources, promoting efficiency and effectiveness and facilitated wider coverage through the use of mobile devices. Anglophone academic institutions, due to the opportunities derived from automation, are gradually making funds available internally to support and sustain library automation projects.

The use and adoption of proprietary and open source automated systems were found to be contemplated in the majority of the academic libraries. The use of open source software has seen successive progress, especially the use of Koha. Library operation such as the cataloguing, circulation, the online public catalogue (OPAC) were the major activities operationalized. Serials and acquisition were found to be the least operationalized.

Developments and trends such as consortia formation, open source, application of project management skills, needs assessment and issues of sustainability were acknowledged by the majority of the librarians. However, developments such as data security, cloud computing, application of discoveries, critical success factors (CSF) and gamification were discovered to be negligible among the librarians.

In as much as automation offers extensive opportunities, challenges such as poor internet connectivity, inadequate and erratic power supply, inadequate technical expertise, inadequate IT support, lack of team work were major challenges experienced by the majority of academic libraries in Anglophone West Africa. Funding and inadequate computers were also identified as problematic.

To address the challenges identified, the following were postulated: capacity building in advanced ICT for librarians, needs assessment, increased collaboration and consortia, availability of systems librarians, provision of adequate power, application of project management skills amongst others.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.1 INTRODUCTION

The study explored the opportunities and challenges of automation experienced by some academic libraries in Anglophone West Africa, sub-Saharan Africa. As much as automation has become necessary among academic libraries, a completely-succesful project is rare. The success rate is still considered low, as research had revealed high software turnovers in some university library automation projects. Consolidating and synchronizing the different automated cases on the opportunities, the challenges, the current state and the experiences of individual academic libraries that had automated or intended to automate were considered viable. Findings and recommendations could serve as a benchmark and a guide to libraries that are yet to automate and motivation to those we have automated.

The study objectives were to:

- Outline the role of automation in academic libraries.
- Present a profile of academic library automation on sub-Sahara Africa.
- Identify some developments and current trends.
- Present the opportunities of academic library automation.
- Identify the challenges experienced by sub-Sahara African academic libraries.
- Provide recommendations to manage identified challenges.

5.2 OUTLINED ROLE OF AUTOMATION IN ACADEMIC LIBRARIES

Academic library automation was found to bridge the gap between the traditional and the modern library. It was found to provide:

1. Effective performance of all the operations of the library such as cataloguing, circulation, acquisitions, serials, reports and amongst others.
2. Increased access to library resources both locally and globally. It enables patrons' to access the services of the library outside the confines of the building.

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3. Exposure to numerous search options such as author, title, subject, date, recently added, amongst others.

4. A platform for libraries to share resources and expertise.

5. Facilitation of Inter Library Loan (ILL) services among libraries through which one can easily check the availability and record of materials by remotely exploring the OPAC.

6. Efficient library services through which materials are processed on time and duplication of activities is controlled. Findings revealed that the resultant countries Nigeria, Ghana, Liberia Sierra Leone and Gambia automated academic libraries experienced such benefits

7. Facilitation and processing of local materials such as thesis.

5.3 PROFILE OF ACADEMIC LIBRARY AUTOMATION IN SUB-SAHARA AFRICA

The following were discovered:

i. Library automation has gained the needed awareness among academic institutions. Gone were the days when the resultant libraries depended heavily on external funding. The study revealed that the majority of academic libraries were cushioned internally by their institutions. Liberia was found to be a major country that relied much on external funding due to protracted internal conflicts (Kesselman, 2012:2).

ii. Most of the academic libraries were found to be aware of the use of library automated systems, proprietary and open source software. The penetration rate of open source software was found to be gradually increasing compared to the use of proprietary software

iii. It was discovered that Koha and XTF open source software were being used in universities in Nigeria, Ghana and Liberia.

iv. Cataloguing was discovered to be the most activated module. Acquisition was the least due to disparities in accounting software and configuration challenges.

v. Considering the enormous benefit accrued to library automation, academic institutions were found to have improved in supporting such projects internally.

vi. Exploitation of consortia approach was found to be viable in assisting such projects

5.4 CURRENT TRENDS AND DEVELOPMENTS IN THE AUTOMATION ENVIRONMENT

The following were found to be prevailing:

i.   Open source was discovered as a major breakthrough for the resultant libraries. Nigeria, Ghana, and Liberia used open source software, but the penetration rate in Nigeria was higher compared to the others.

ii. Application of project management skills to library automation projects was discovered to be laudable.

iii. ICloud /cloud computing as a development had not gained much recognition in Anglophone Western African libraries.

iv. In as much as librarians' capacities were built especially in Information Communication Technology (ICT), identification of needs and analysis of gaps prior to the training was commended.

v.   Consortia approaches were found to be one of the developments.

vi. It was revealed that majority of academic libraries were not abreast with the processing of local contents such thesis and dissertations via automation.

vii. Sustainability of automation projects were a concern for most academic libraries

viii. Trends and developments, such as gamification, application of social media tools, discoveries and mobile devices cognizance were on a decrease.

5.5 OPPORTUNITIES OF AUTOMATION IN SUB-SAHARA AFRICA

i.   Increased access to diversity of resources simultaneously, as well as remote access to local and global clientele, was tagged as a major opportunity.

ii. It was discovered to have facilitated retrieval of information as a result of numerous search options.

iii. Resource sharing was mentioned as a major impact of library automation. Individual libraries could cut down cost on acquisitions in order to share resources.

iv. There was wider coverage on information dissemination as a result of increased web visibility

v.   Efficient and effective performance of service were achieved via automation.

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vi. Fast and convenient services to patrons via alert services.

vii. Accurate and timely generation of usage reports and statistics.

viii. Created synergy between patrons' information need and library resources.

ix. It facilitated the collation of staff research output (Kari & Baro 2014:17).

5.6 CHALLENGES

I. Inadequate and erratic power supply impeded the use of automated systems in Anglophone West African academic libraries

II. Inadequate technical expertise such as systems librarians to manage automated projects was identified as a challenge, this was compounded by high attrition rate.

III. Poor internet connectivity was experienced by the resultant libraries

IV. There was limited exploitation of project management skills

V. Lack of computers was discovered.

VI. Poor corporation and collaboration was discovered to impede consortia formation.

VII. Administration of library automation in teams was discovered to be least applied among automation project teams.

5.7 RECOMMENDATIONS

i. Awareness on developments and current trends such as cloud computing, gamification, discovery as a tool, data security, mobile applications and social media tools, amongst others, needed to be intensified.

ii. It was recommended for academic libraries to invest in order to sustain themselves.

iii. Librarians with technical and advanced knowledge in automation were commended to share experiences with those intending to automate, thus knowledge sharing.

iv. Building of capacity of librarians in advanced ICT was recommended due to the changing nature of technology over time.

v. The need to imbed ICT in professional librarianship curricular to encompass automation was recommended.

vi. Acquisition and application of project management skills were commended; this would enable the completion of automation projects on time, budget and specification.

vii.   Increased collaboration and consortia formation were recommended.

viii.   Constant professional development by librarians was mentioned. This was because ICT easily becomes obsolete.

ix.   Improvement in internet connectivity was endorsed by the majority.

5.8 SUMMARY OF FINDINGS

Anglophone West African academic libraries, compared to countries in the East and South also experienced opportunities and some challenges in their quest to automate. Automation plays a vital role in academic endeavours of academic institutions, hence the realization and support of automation projects. Increased access to information as one of the core function of automation was endorsed. This aspect was essential for human development in the areas of research, teaching and learning. Academic library automation has the ability to increase a library's visibility on the web, enhanced resources sharing and to manage research output.

Some Anglophone West African academic libraries were discovered to exploit new developments in library automation environment. These included: open source software, application of project management skills, consortia, needs assessment, teamwork, sustainability concerns, amongst others. Data security, cloud computing, application of discoveries and gamification awareness were minimal.

Challenges such as inadequate power supply, poor internet, lack of expertise, inadequate project management skills, lack of computers and errors in data entry were identified.

5.9 CONCLUSIONS

The study revealed extensive opportunities on academic library automation. Like the situation in other libraries, Anglophone West African academic libraries experienced similar benefits. Though the process seems to be in transition with its evolving technologies, it has seen gradual application of developments and trends such as open access. In spite of these benefits, however, certain challenges were discovered to have impeded the process. This study therefore presented a consolidated finding on the opportunities, experience and challenges to academic library automation.

5.10 SUGGESTIONS FOR FURTHER RESEARCH

Investigation of open source software penetration among Anglophone West African Countries.

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APPENDIXES

QUESTIONNAIRE: ACADEMIC LIBRARY AUTOMATION

The study is being conducted across institutions in Anglophone West Africa to seek the views of senior academic library staff on the opportunities for academic library automation, the current state, the challenges, experiences and recommendations.

Completion is anonymous and voluntary. The data will not be retained once the study is complete.

1. Please indicate the name and address of your Library.

2. Please specify the automated system in use.

   ❖ Virtua automated system ☐

   ❖ Millennium ☐

   ❖ Koha ☐

   ❖ OpenBiblio ☐

   ❖ Alexandria ☐

   ❖ Other (please specify)

3. Please rate your degree of satisfaction with the system in use

   ❖ Strongly satisfied ☐

   ❖ Satisfied ☐

   ❖ Neutral ☐

   ❖ Dissatisfied ☐

   ❖ Strongly dissatisfied ☐

4. Please explain your response to question 3:

5. Which modules have you integrated or activated?

- ❖ Cataloguing ☐
- ❖ Circulation ☐
- ❖ Acquisition ☐
- ❖ Serials ☐
- ❖ Online Public Access Catalogue (OPAC)
- ❖ Reporting ☐
- ❖ Others (please specify)

6. Please indicate which kinds of support for library automation are available at your institution and then rate the importance of each by ticking the appropriate box.

	Available ?		Importance?				
Support	Yes	No	Not important	Limited importance	Important but not vital	Very important	Highest importance
Technical							
Financial							
Capacity-building							
Infrastructure							

If there are other kinds of support available, please list them and rate them using the same scale:

7. Indicate the sources of support and rate them from 1 to 4 with 1 being non availability,2 being the least available,3 available and 4 being the most available form of support

- ❖ External support ☐
- ❖ Internal ☐
- ❖ Government ☐

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❖ Consortia/cooperation ☐
❖ Other (please briefly describe and rate)

8. Using the rating scale 1-5, where

             1 means I Strongly agree
             2 means I Agree
             3 means I am Neutral
             4 means I Disagree
             5 means I Strongly disagree

Please rate the following potential benefits of library automation:

Benefits	Rating
Increasing access to library resources	
Resource sharing	
Efficient and effective performance	
Easy processing of local content (thesis, dissertation ,reports)	
Increasing collaboration among libraries (ILL)	
Freeing of physical space	
Improving the image of librarians	
Increased visibility	
Fast and convenient services	
Usage reports and statistics	
Other (please specify and rate)	

9. Using the rating scale 1-5 where
>   1 means I Strongly agree
>   2 means I Agree
>   3 means I am Neutral
>   4 means I Disagree
>   5 means I Strongly disagree

Please rate the perceived importance of these aspects of, or developments in, library automation:

Trends	Rating
Free and open source software	
Automation as project	
Discovery services	
ICloud /cloud computing	
Consortia/cooperation	
Collaboration and consultation with stakeholders	
Needs Assessment	
Capacity building	
Team work	
Data security	
Sustainability	
Gamification	
Social media applications	
Mobile devices	
Other (please specify and rate)	

10. What have been the principal challenges you have experienced in automating your library?

11. How can these challenges be addressed in your library?

Thank you for your cooperation