ASSESSING HUMAN ERRORS AND STAFF SKILLS IN USE OF THE AMLIB SOFTWARE IN EGERTON UNIVERSITY LIBRARY, NJORO - KENYA

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A Thesis Submitted to the Graduate School in Partial Fulfilment of the Requirements for the Master of Arts Degree in Information Science, Egerton University

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DECLARATION AND RECOMMENDATION

Declaration

I declare that this thesis is my original work and has never been presented in any institution of higher learning for examination.

Signature.. Date...10/07/2020...........................

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Recommendation
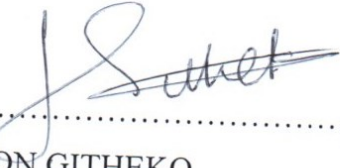
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DEDICATION

This research is in honour of my late father Mr. Muchiri Mwangi and my family for their financial and moral support.

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ABSTRACT

Integrated Library Management Systems (ILMS) are essential components in libraries that support the processing, storage, management, and retrieval of data. Before the advent of ICT in libraries, Egerton University's main library data was manually created and managed in card format; arranged in a way that facilitated access. Librarians made many errors in the development and management of the metadata especially when filing records whose words/terms were wrongly written or abbreviated. They were also overwhelmed by the mass of conventional paper records in trays, some with data illegibility. The need to automate library operations and subscribe to an ILMS such as AMLIB software that could reduce human labour and errors was critical. However, the AMLIB software has not been able to eliminate human errors entirely, but rather the errors changed their formats from paper to machine-generated. The errors continue to elicit conflicts between library staff and the library users, occasioning the necessity for this study, which aimed at exploring the types of human errors that occur while using the AMLIB software, explaining the sources of errors, and examining the staff skills and training needs in working with AMLIB software at Egerton University library. The study adopted the Unsafe Acts Model by Desai, which is an information system theory that deals with errors in software, to illustrate the interaction between the independent and dependent variables. The case study undertaken describes the current state of AMLIB software in Egerton University library, by use of quantitative and qualitative data. Purposive and simple random sampling was used to sample the target population that comprised staff and students of Egerton University. Questionnaires and interview schedules were used to collect data from the participants. The Statistical Package for Social Science (SPSS) program version 21 was used to analyse data that is presented in descriptive statistics, tables and graphs. The study encountered major human errors in omissions, errors of commission, and errors of record redundancies. The errors occur mainly because of insufficient staff training, complex system processes and procedures, staff fatigue, inadequate supervision, and defective security checks at the library exit points, among others. The study recommends regular staff training, adequate system control, close staff supervision, and sufficient surveillance at all library exit points as ways to minimize human errors in the use of the AMLIB software.

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ABBREVIATIONS AND ACRONYMS

DBMS	Database Management System
EU	Egerton University
FASS	Faculty of Arts and Social Sciences
GUI	Graphic User Interface
HCI	Human-Computer-Interaction
HOS	Head of Section
ILLS	Inter-Library Loan Services
ILMS	Integrated Library System
ISO	International Organization for Standardization
KNLS	Kenya National Library Services
OCLC	Online Computer Library Centre
OPAC	Online Public Access Catalogue
OSS	Open Source Software
PS	Proprietary Software
SDI	Selective Dissemination of Information
SPSS	Statistical Package for Social Science
TINLIB	the Information Navigator Library Software
VPN	Virtual Private Network

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

All over the world, academic libraries are considered as the intellectual centre of the universities they serve and are dedicated to increasing information resources to support the teaching, learning and research activities of respective faculties. In the developed world, there are largely innovative library services that have been brought about by the advancement in information communication and technology (ICT) opportunities. Integration of technologies into existing traditional library services is a common feature aimed to support the research, teaching and learning missions of the universities. Cheryl (2011) outlines the services provided through ICT by libraries in developed nations as those that include; access to online public access catalogues, online subscription databases and digital collections, reference and research assistance, instructional services, current awareness services, interlibrary loans, exhibits, and internet access. Advancement in the use of ICT has made libraries in the developed world to become not only summits of references to academic works but also facilities that promote real-time access and discharge of new information. They serve as points for sharpening skills in information searches, use and storage Cheryl (2011).

In some parts of the continent, especially in the sub-Saharan Africa, the use of ICT in academic libraries has been achieved to limited levels that are centred on reader services especially on internet access, lending, and use of the Online Public Access Catalogue (OPAC). Jain (2016) explains that many library functions in Sub-Saharan Africa continue to depend heavily on library manual systems due to reasons of poor ICT infrastructure, limited variety of choice of software that in most cases are unaffordable, high cost of automating libraries and the ever-growing user training needs. She observes the notable major developments in ICT as those of online scholarly communication, digitization, and document preservation.

In East Africa and especially Kenya, automation of academic libraries is rapidly growing due to the development in ICT infrastructure in the recent past and is gradually penetrating and embraced by many types of information canters besides the academic libraries. Moreover, the academic institutions, both private and public, are fairly distributed in most parts of the country which has seen significant inroads of ICT infrastructure to the rural areas. According to Chepkwony (2012), the history of academic libraries in Kenya dates back to the time when the

first academic institution was established, the Royal Technical College in 1956. It was transformed into a national university and was renamed the University of Nairobi. Academic institutions have increased since then, and today there are many public universities, such as; the University of Nairobi, Moi University, Kenyatta University, Egerton University. These public institutions have libraries that are automated and use different software which are either Open Source Software (OSS) or the Proprietary Software (PS).

1.1.1 Brief history of Egerton University main library

The History of Egerton University Library dates back to 1939 when Lord Egerton of Tatton donated 400 hectares of his farm to the government of Kenya for a farmers' training school. According to Egerton (2019), the library opened its doors in 1939 to serve only (3) students who were admitted to the farm school. The library started as a resource centre in a small room and had a small collection of books kept in a cupboard. In 1946 a nine-month certificate course was started and this saw increase in the library user population to 45 students. In 1950, the school library became a college library. Thereafter the first college library building with a sitting capacity of about 100 readers was constructed and opened in 1967.

Due to the high demand for the diploma programmes, the student numbers increased and consequently the demand for library services and proposal for a larger library were made. The construction of an extension of the library was done to accommodate between 25,000 and 30,000 volumes of books and journals and an additional sitting capacity of 200 readers. As the College grew in terms of programs and students, there was need for a larger library. Construction of a one-storied library building (the current University Library) started in 1980, designed to seat about 600 users and hold about 50,000 volumes of books. The building was completed and officially opened for use in 1983. In the same year, the library registered users grew to 360.

In 1987, Egerton (2019), documents that the College was upgraded to a University and the Library became a University Library. As the University grew from the three students in 1939 to the current registered student population of about 24,000, the library too grew in terms of book volumes, library staff as well as the library services. Today, the library collection has grown to 362,952 comprising 134,136 print resources and 227,816 e-resources. The registered users have also grown from the 360 in 1983 to 15,053, according to 2019 AMLIB system

database. According to Egerton (2019), the Library has a staff population of 92 distributed in the main library and nine (9) branch libraries in various locations in Njoro, Nakuru, and Nairobi. The main library automated its services in 2009 and uses the AMLIB software.

1.1.2 Library Automation and Software

The development of Information and Communication Technology (ICT) created an environment in which libraries automated their information acquisition, storage, dissemination, and circulation services. There are many varieties of Integrated Library Management Software in the market such as TINLIB (The Information Navigating Library), formerly used by Moi University Library before changing to ABCD (Automatisación de Bibliotécas y Centros de Documentación), Koha, used by more than 15 public universities in Kenya and Vubis Smart, used in the University of Nairobi's Jomo Kenyatta Memorial Library, among others. Egerton University's main library, Kenya National Library Services (KNLS) and Bandari College Library Mombasa subscribe to the AMLIB software.

Depending on their information management needs, libraries subscribe to software guided by considerations such as cost, versatility, interoperability, user-friendliness, user training requirements and the speed for fast identification, access, and retrieval of information. However, the software are prone to errors at different levels of usage. Different software has unique challenges that lead to error occurrences that need to be identified and their sources known so as to lay appropriate mitigation factors. Norman (2012) says that the type of automation by an institution dictates the duration that error can exist without being noticed or responded to. This is an admission that software is prone to errors.

Before the dawn of ICT and by extension the Integrated Library Systems, Rach (2014), observes that many academic libraries were using in-house manual systems to process, store, retrieve and circulate library collections to library users. Rach attributes the practice to the high cost of investing in computers, software and the infrastructure that was not justifiable to spend in serving the then small number of users in information centres and hence a manual system continued to be sufficient.

The manual systems brought about many variations and inconsistencies in information processing and use such that materials that were similar in content were dispersed in their shelf

locations. This was because staff interpreted the Cataloguing and Classification codes differently. The disparities made it difficult for users to access and retrieve information resources promptly and instead wasted much time browsing the shelves. Information users at times were compelled to request librarians to retrieve materials for them rather than use the burdensome catalogues and other retrieval devices available.

Fong (2012) disapproves these practices by pointing out that it is counter-productive and cumbersome to have a system that only librarians understand. Fong, acknowledges that the purpose of a catalogue is to showcase library collections to users through a user-friendly interface. Supporting the need for standard authority documents that could control the format of data entry, Bakewell& Chandler (1972), lamented the many cases where librarians violated processes and procedures during classification and cataloguing practices. This, therefore, explains that there lacked unified practices in describing information resources which led to the disparity of documents in library shelves, location and cumbersome retrieval tools. However, there were available control documents that gave guidelines on processing library documents, which staff ignored to consult such as the Anglo-American Cataloguing Rules (AACR2) and the Library of Congress (L.C) Subject Headings.

In order to address these challenges, the EU library acquired AMLIB Integrated Library Management System (ILMS) that could standardize the processing of library information resources in ways that entries of records could be accurate and consistent. Further, the ILMS was to reduce duplication of records, wrong surcharges on non-overdue books, missing records, staff workload, and generally minimize occurrences of human errors.

Though the AMLIB software was noted by Nyamboga, Ongus and Njuguna (2012), to have remarkably impacted positively to most operations of the library, it is unfortunate that human errors continue to occur in the face of academically qualified staff who are expected to demonstrate expertise in carrying out system operations. This research study therefore explores the types of human errors and their sources and examined the library staff's capacity in skills and knowledge in working with the AMLIB software.

1.2 Statement of the Problem

Management of information resources is an everyday challenge to libraries world over. Integrated Library Management Systems (ILMS) are designed with the view of satisfying the information processing and management needs of libraries in the functions of acquisition, processing, cataloguing, and circulation services. Embracing library automation in Information Communication Technologies (ICT) has freed libraries to choose between the Open Source Software (OSS) or the Proprietary Software (PS) in the market, depending on convenience of use, cost and suitable to its functions, among other considerations. Egerton University library acquired AMLIB software, which is Proprietary Software (PS), for its automated services. Human errors arise while using the AMLIB software that impinges on staff performances in the information processing, storage, searching, access, and in loan clearances. The errors create conflicts between library users and library staff leading to delayed services delivery and also contribute to the library becoming contentious and inaccurate in its stock and claims. Indeed, there are lots of documents written on the suitability of the OSS and PS software but unfortunately, there lacks documented evidence written on the types and sources of human errors that arises while using ILMS, and particularly the AMLIB. This study is therefore, aimed at creating knowledge about the type of human errors and their sources as well as addresses the staff skills and training needs that can help to mitigate the challenges and other problems associated with the use of the ILMS software and in particular, the AMLIB software.

1.3 Purpose of the Study

The purpose of this study is to assess the human errors that occur in the use of the AMLIB software at Egerton University main library and to explain their types and sources while investigating the staff skills and knowledge in working with the AMLIB software. The study will also suggest possible solution that can militate against error occurrences.

1.4. Objectives of the Study

The objectives of the study were:

i. To explore the types of human errors associated with the use of the AMLIB software at Egerton University Main Library.

ii. To establish the perceived sources of the human errors associated with the use of the AMLIB software at Egerton University Main Library.

iii. To examine the skills and knowledge deficiencies of the library staff that limit the effective use of AMLIB software at Egerton University Main Library.

iv. To suggest a model upon which issues identified could be improved.

1.5 Research Questions of the Study

The study sought to answer the following research questions:

i. What types of human errors occur in the AMLIB software at Egerton University Main Library?

ii. Which are the perceived sources of human errors associated with staff in the use of AMLIB software at Egerton University Main Library?

iii. Are there errors that are brought about by the software?

iv. Are staff well trained to work with the AMLIB software?

v. What are the skills gaps that AMLIB users have that inhibit the effective use of the software at Egerton University Main Library?

1.6 Significance of the Study

The study will help AMLIB users to understand the types and sources of human errors that occur in the use of the software and lay strategies to militate against their occurrences. Knowledge gained from the study will help contribute to the identification of new strategies of training staff on the AMLIB modules so that to improve skills and efficiency in their daily chores.

Library users will benefit by easily and quickly accessing data that is free of redundancy. Implementing the findings of this study will help reduce or stop conflicts between library staff and library users that stem from inaccurate claims, jumbled data entries in the OPAC and circulation records, erroneous charges on loans and delayed user services.

1.7 Scope and Limitations of the Study

The AMLIB software is a proprietary (paid for) ILMS that is used in many types of libraries in the world. Because of its international outlook, this study discusses specific types and sources of human errors and also determines the users' competence to work with the software at Egerton University's main library.

The problems identified in the use of the software are not unique for the Egerton University library situation alone, but maybe similar in other libraries that use the same software. This is because the major sources of errors can be attributed to different sources ranging from work environments, staff motivation, staff trainings, to those of the AMLIB operation procedures which are relatively similar in other libraries. Nevertheless, the study is not a comparative study between the AMLIB software and any other software or between Egerton University library and any other institution. The findings can be generalized to other libraries that use the AMLIB software and other software that may have similar features and work environments.

The study focuses on the errors emanating from the Technical Services division, where the processing of library information resources is done, and in the Readers services division, where circulation services are provided to library users at Egerton University Library.

Ultimately all errors including system errors are caused by human beings either at the execution level or during programming. This research limited its scope to errors caused by software users at the operational level but not to problems related to system failures.

1.8 Operational Definition of Terms

AMLIB – It is proprietary internet-dependent software or program used in libraries as an Information Management System tool that helps to manage databases by way of acquiring, processing, storage, retrieval and circulation of information resources to library users.

Error – Is any deviance from doing the right thing. It is wrong actions taken in use of the AMLIB software that leads to the library suffering the consequences.

Error of Commission –Refers to data entries referring to wrong documents or wrong user's error of omissions.

Error of Omission –Refers to document/data missing from the database and are not searchable because they do not exist.

Error of Redundancy -Occurs where a single entry is duplicated with minor changes or no changes in the OPAC, and gives wrong impression of the library collection.

Graphic User Interface (GUI) – It is a user interface in AMLIB software that enables users to recognize meanings of symbols, icons, and visuals presented as graphics. In the AMLIB software, the GUI interface is found on the AMLIB icon after one logs-in.

Interoperability - is the ability of different information systems, devices and applications ('systems') to access, exchange, integrate and cooperatively use data in a coordinated manner, within and across organizational, regional and national boundaries. - It is a characteristic of a product or system, whose interfaces are completely understood, to work with other products or systems, at present or in the future, in either implementation or access, without restrictions.

Lapse error – It is a human error caused by memory failure on the action a person is required to take at a certain stage in a process. It is noted when one forgets the right process to achieve good results.

Latent error – Errors caused by humans because of system defects such as failure to give warning against impending action, poor maintenance and incorrect installations.

Open Source Software (OSS) – They are free integrated library management software owned by the library once acquired and are managed by the community of users within a region who customise the software according to their emerging needs.

Proprietary Software (PS) – These are subscribed integrated library management software that are paid for annually to the vendor and are supported and maintained by the vendor throughout the contract in updates and installation of new versions.

Slip error – Is an error caused when a person loses concentration and skips a step or misses out some important data. Pressing the wrong buttons in the system leads to this type of error, caused by inattentions.

System Violation – It is the breach of regulations and procedures such that the resultant data is vague in meaning and may give an incorrect state of the business.

Unsafe Act – These are actions or commands executed by a systems' user either consciously or unconsciously that impact negatively on the expected outcome.

User Interface – Links that facilitate interaction between the user and the AMLIB software in the performance of an activity.

Versatility – Is the capacity in which the AMLIB software is able to carry out many operations.

<center>**CHAPTER TWO**</center>
<center>**LITERATURE REVIEW**</center>

2.1 Introduction

This chapter examines prior studies done on the kinds of human errors associated with the use of Integrated Library Systems and their causes and effects on service delivery in libraries. Later in this chapter, there are highlights on the theoretical framework and the conceptual framework of the study that illustrates the interaction between independent, dependent and intervening variables.

2.2 Automation of Libraries in Developing Countries

The automation of information centres such as libraries in the developed world has been influenced by the increase in the use of digital information and the need for high-speed information exchange and transfer. Beebe (2017) observes that libraries in developed countries have fairly favourable advantages in ICT infrastructure that enhances automation of their operations and services due to ever-growing technological development. The development of different information management software has increasingly allowed developed libraries to procure software and their different modern versions found in their markets that meet their information management needs.

There are many advantages realized by libraries and their users in an automated system. According to research on library automation in Botswana, Mutula (2012) says that the impacts of automation include increased access to a diversity of electronic resources, and enhanced image of librarians. Beebe (2017), worries that in Africa, access to ICT is not as prevalent hence the higher education institutions are embracing learning networks to counter the challenges posed by a fast changing and increasingly inter-reliant globe.

Unlike the situation in the developed countries, automated library systems in the last century were not common in developing countries especially in Africa. Imo and Igbo (2011) found that most Nigerian university libraries had not successfully automated all their operations because of problems related to software selection, acquisition, and maintenance. They explain that it's challenging because it requires prior understanding of the librarians that the software is sufficiently powerful and versatile to cope with all library processes and must remain user-friendly. The automation is gaining popularity especially with public and academic libraries

that have a large readership. Nevertheless, Imo and Igbo are of the opinion that today, libraries that are not automated due to financial and technological challenges are seen to be excluded from the mainstream profession of librarianship. This sentiment is echoed by Beebe (2017) who affirms that development of ICT in Africa's libraries is slowed down by the ever-declining quality of university education' resulting from the combination of dwindling resources and growing enrolments.

Kenya has been at the forefront in embracing automation with most of its public and academic libraries becoming automated in the last two decades (2000-2019). Ondari-Okemwa (1999), while discussing challenges of automation of Moi University Library in Eldoret, Kenya, observed that managing a library automation project successfully in rural Kenya poses managerial and technical challenges. Kamba (2011) adds that ICT is not well spread and utilized in African institutions of higher learning, mainly because of poor communication network, limited access to ICT hardware and software and government's ineptitude to provide adequate funds to run the libraries. He notes that most public and academic libraries are located in rural areas where ICT infrastructural challenges are predominant. However, for the automated libraries, the use of any type of software is compounded by unique challenges that predispose its users to create errors in the cause of undertaking software functions.

2.2.1 Integrated Library Management System

Integrated Library System (ILMS) is a computer-based system used to manage internal and external business information of an organization or institution that is about assets, finances and human personnel. The main aim of ILMS is to simplify and break down tasks into different modules that can be handled by sections within a system under a centralized database.

Scoff (2014) defines a system as an entity which is composed of elements and relationships that hold between each of its elements and at least one other element in the set. Each of a system's elements is connected to every other element, directly or indirectly. A system is made up of many sub-systems that mutually share data by the use of software that facilitates their coexistence for the good of the entire system. This means that each sub-system is dependent on the other. Pratheepan (2012) explains that ILMS functions are managed via a central system with processes that transparently exchange data between functional components such as catalogue records and circulation transactions. Haonan (2013) acknowledges the importance

of an information management system saying that it is the ILMS that has successfully freed people from managing data manually and that the use of ICT is inevitable in this information age, which is characterized by high-speed information flow and exchange.

ILMS in libraries is used to keep administrative information of patrons and the collection in both print and electronic media such as student names, course registration, collections available for loans, restricted/reserved collections, among many other data. Lindsay (2004), says that in automated systems, information professionals can see how their stock is being used and refine it to meet the needs and interests of borrowers. It could, further, enable librarians to monitor and report the use of data that they control more effectively and efficiently. Sani (2006) affirms that an ILMS would be able to integrate with other key system which means that information searches can be conducted on all data made available across networks. This would enable users to access information and services from their desktops as well as in remote areas via a Virtual Private Network (VPN).

In ideal situations, the integrated library management system must be able to handle many formats, accommodate searching on the internet, and provide a variety of functions including manipulating electronic data without distorting facts, working with graphics and hastening resource sharing.

2.3 Types of Human Errors

Human errors in the use of integrated library management software can occur in different ways and formats. According to Mutula (2012), there are errors that are caused by deliberate violation of rules such that a lot of information is omitted, while others arise out of slips and memory lapses that are not intended but they occur. He observes that a wrongful stroke of a computer key can lead to errors where the computer executes the wrongly executed command. Norman (2013) and Reason (2012), agrees that many errors may result from the carelessness of people, inattention, and multi-tasking such that one has little or no time to verify the results of actions taken. They add that there are errors that result due to environmental interferences such as power surges, dust, sudden crash of the system, recovery complications and haphazard transfer of system peripherals while not switched off, and finally because of fraud and corruption.

Reason (2012), viewed human errors in two ways: the person approach and the system approach. The person approach focuses on the errors and procedural violation of processes such as forgetfulness, inattention, poor motivation, carelessness, negligence, and recklessness. These are moral issues with the assumption that bad things happen to bad people which psychologists call "the just-world hypothesis". Reason suggests that they could be countered by "instilling people's sense of fear, rewriting procedures or adding to existing ones, taking disciplinary action, threat to litigation, retraining, naming, blaming and shaming. In the system approach, Norman (2013), sees these errors as consequences rather than causes that include recurrent error traps in the workplace and organizational processes that give rise to them.

To counter the errors, Reason and Norman give the assumption that it's difficult to change human conditions but easy to change the conditions under which humans work by having system defences in place such as warnings in form of text, light or sound such that when an error occurs, the obvious action is to find out why the defences failed to give alert to the software user.

2.3.1 Slips and Lapses

According to Norman (2013), slips are types of errors that occur when a person intends to do one action but ends up doing something else, which means an action performed is different from the action that was intended. The slips are classified into two namely, action-based slips and memory slips. Action-based slips occur when the correct action is applied to the wrong object. For instance, scanning the right book but assigning it a wrong class number intended for a different item. The action is indeed correct, but the goal is wrong. This occurs mostly due to inattention when someone is executing an action.

According to Norman, memory lapse slips are associated with forgetting to take action when required. This occurs when individuals forget that action was to be taken on certain circumstances. An example is forgetting to cancel the returned book from loan records. The error is quite nagging such that it results to so many complaints from users of the library and occurs at both execution and storage stages.

Reason (2012), argues that cases of incorrect actions such as miss-keyed commands, skipping a step in cataloguing procedure and creating an unsuitable plan for achieving the desired goal

causes both action-based slips and memory slip errors. Slip errors will allow the creation of a record that will be very difficult to retrieve when required and lead to complaints and confusion. For example, entering the call number of an item in a field reserved for the barcode. On the other hand, memory lapse error, according to Norman (2013), occurs when a software user skips a step in following procedures, repeats a step, forgets an outcome of an action or forgets the goal or plan causing an action to be stopped. For example, the software user forgets to press the icon for "create" new record only to find out later at the time of saving a file that "save file" icon is inactive and therefore must abandon or discard a created record. Also, the error can cause the software to reject storage of data that has gaps when someone tries to update or create a new record. These errors cause delays in the retrieval of files thereby denying or delaying service to library users.

Norman adds that memory errors are caused by interruptions that occur from outside the system that the system user is not able to control such as noise and interference from people around when the action is being taken. He nevertheless does not rule out the possibility of interruption coming from the system itself such as when it refuses to respond and closes down.

2.3.2 Mistakes

A mistake is categorized as a planning failure. Reason (2012), explains that a mistake occurs when a person intends to act, does so correctly, the action is inappropriate, and the desired goal is not achieved. He classifies mistakes as rule-based and knowledge-based errors where wrong rules are followed and misdiagnosed as problems because of incomplete knowledge. Norman (2013) agrees that mistakes occur when the wrong goal or plan is formed and even if actions are taken, they are part of the error because the actors themselves are inappropriate. In addition to the two types of mistakes given by Reason (2012), Norman (2013) adds a third level of mistake known as the memory lapse mistake that takes place when forgetfulness occurs at the stages of setting up goals, planning, and evaluation. An example is an incomplete posting of records due to distractions.

2.3.3 Social Pressure Errors

These are errors that occur when people change their behaviour especially when they are under stress to accomplish an operation. People will avoid following laid down procedures in carrying out functions because they are either in a hurry to leave and sometimes want to be seen by their

supervisors as good workers who meet work deadlines. The power of social pressure, observes Norman (2013), is so dangerous that it influences sensible people to do things they are aware are not right. The pressure to join colleagues in a discussion or an activity distracts a persons' concentration and sometimes one is tempted to violate processes and procedures so as to quickly clear an assignment.

2.3.4 Software Vendor Errors

Almost all software produced has unique in-built challenges that impede their full potential in service delivery. According to Mott (n.d.), the effects of software errors can range from trivial flaws in the appearance of user interface to fatal errors that can crash a programme, cause data loss and limit productivity. Mott adds that software bugs are common because of the challenges of finding incompatibilities in products that lack tangible form. Cicnavi (2010) confirms that there are typical system errors that are dependent on the versions of operating system being used, the kind of hardware installed in the operating system, the device drivers used, and the types of applications installed. Mutula (2012) identifies software errors associated with the vendor as those of lack of warnings, lack of discussion dialogue boxes and poor user interfaces arising from software weaknesses. However, the vendor errors are dependent on the internal design of the software and they technically occur without intrusion of the system user.

2.4 Sources of Human Errors in Software

All types of errors are caused by people in the cause of executing operations. Most systems are designed in full view of possible errors that would emanate from humans as they interact with the software systems. Most systems are designed in a way that human errors are correctable, revocable, recoverable and avoidable. Norman (2013) identified some reasons that drive people to cause errors such as the nature of tasks and procedures that compel a person to stay alert for long hours, besides, multi-tasking where one is subjected to interfering activities. However, other underlying issues that cause errors to software include; inadequate training of users, time pressure and environmental factors. Knowledge and skills to operate software are acquired through training that could be formal or conducted in-house. Time stress is a major cause of errors especially when a person does things fast without verifying actions so that to beat deadlines or reduce long queues at circulation desks in academic libraries. People take risks by violating routine procedures to accomplish tasks. Norman cautions that deliberate violations

cause many accidents that result from slips and memory lapses. Environmental factors such as distractions by noise and people around also contribute immensely to occurrences of errors.

Nyamboga, Ongus and Njuguna (2012), found out that indeed human errors do occur and that each error is occasioned by circumstances surrounding it. However, the study discussed the achievement brought about by the AMLIB system in the E.U. library but did not address the types of errors and their actual sources, an area that this research has addressed.

In E.U. library, users of the AMLIB software undertake informal training on the operations of the software so that to be introduced to the system environment. This is undertaken with expectations of improving efficiency in staff work output as well as increasing accuracy in speed of service. However, this training is partially not effective as errors continue to be witnessed in databases and service points within the library. Human beings are the designers and manufacturers of software that facilitate the processing and management of data which is rapidly created in the course of conducting various businesses. Due to the human fallibility of the mind related to the software application and knowledge-based requirements, errors are prone to occur, raising questions on the suitability of the software.

Desai (2010), states that human errors are caused by humans rather than machines. There are circumstances under which people make errors while working with computer software in a library such as;

(i) Doing the wrong thing in a situation, for example, forcefully shutting down the system while the software is running or renewing a loan item instead of returning it.

(ii) Planning to do the right thing with the wrong outcome, for instance, saving files instead of updating them, misspelling terms or giving wrong coding to a stock item.

(iii) Failing to do anything when action is required, for example, failing to save or update the entry of a record but instead log out of the system.

2.4.1 Intentional and Unintentional Acts

Errors are caused by unintentional and intentional acts. According to Desai (2010), causes such as lack of concentration, carelessness, and fatigue, are bound to occur due to attention and memory failures while dishonesty, and fraud, are seen to be caused by mistakes that are intended to violate and sabotage the software. Mutula (2012) observes that lack of proper

training of librarians in using ILMS could also contribute to occurrences of errors. Also, weaknesses of software, for instance, lack of warnings and poor user interface are perceived causes of human errors. However, some errors occur accidentally as a result of either skipping a process or not understanding the implication of taking an action. Norman (2013), provides causes of memory lapse as; failing to follow all steps of procedures, repetition of steps, forgetting the outcome of an action and forgetting the goal or plan causing an action to be stopped. In rare cases, some systems have complicated procedures that are hard to follow or have poor Graphic User Interfaces (GUI) whose physical appearances do not make sense as expected. Intent to sabotage the system or crash the system, network failures, and power surges are other hypothetical factors that cause errors in the software.

2.4.2 Mode Errors Slips

These are errors that occur where the system uses a single control such as a button or a command for multiple purposes, used in varying modes to realise different results. This occurs when the designer wants to save space in software, reduce cost and reduce intimidating complex controls (Norman, 2013). Though the control may look simple and easy to use, the simplicity masks the complexity of use that leads users of the software to forget the processes and procedures of operating the control buttons. To circumvent the mode error scenario, the system users should be in free-interruption environment that would not distract their memory from the currently active mode. Norman supports the use of single control modes but warns that if maximum attention is not paid by the system user, they become common sources of confusion and errors in the use of the software.

2.4.3 Errors of Deletion

The deletion of electronic records simply means marking the space as usable which can be overwritten with other data many times until deleted data becomes irretrievable. According to Dorion (2008), when data is deleted, it is typically no longer readily accessible by the operating system or application that created it. Library functions involve the creation of files as well as deleting those files whose transactions are completed. However, there are instances when files are retrieved and are erroneously formatted or deleted from the library database such that it becomes hard to recover when required. This is an error that can be attributed to staff carelessness, inattention, memory failure and fatigue. The error causes embarrassment to the library especially when retrieval tools such as the OPAC, unfortunately fail to identify library

users and/or library resources and point out their locations while they are registered users or the collection is within the library. Good software should be able to identify deleted files and make them easily recoverable.

2.4.4 Errors in Database Cleaning and Update

The database needs to be kept clean at all times from unnecessary redundancy. In ideal situations, regular cleaning is necessary by authorized personnel. Wu (2013) defines data cleaning as the process of detecting and correcting corrupt or inaccurate records from the database. The writer adds that it involves identifying incomplete, incorrect, inaccurate or irrelevant parts of the data and also the use of computer programmes that are capable of correcting several mistakes such as tracking down redundancy and showing missing codes to records.

The exercise of database cleaning in the academic library like Egerton library is compounded by many challenges such as inexperienced staff, inadequate equipment and multifarious university programmes that give inadequate recess to library staff to embark on the data cleaning exercise.

2.5 Personnel Capacity in Use of Software

Computer software is an important tool for data management in organizations and therefore the security of the data is of paramount concern to the managers. During the design and development of software, the designer and developer need to understand the people to whom the system is intended and put much consideration on their requirements as the top overriding priority. Smith-Atakan (2006), affirms that users of the software will make mistakes and it is important to identify what those mistakes maybe and design a system to prevent them from ever occurring, rather than allowing them to occur and tidying up the mess afterward. The software is expected to be easy to use, learn, manipulate and master its operations to avoid making lots of mistakes that would lead to expensive corrections. Anderson (2008) invented the use of a rule called "The Anderson Rule" when designing systems that is based on the principle that large databases will never be free of abuse by breaches of security. Further, he states that if a large system is designed for ease of access, it becomes insecure; if made watertight it becomes impossible to use. Many factors pose risks to software systems but of

great concern are the human factors because people are the main users of the software entrusted with the success of the organization.

Ward (2012) agrees with Anderson by saying that users of the system are themselves the biggest risks to the databases while they remain the biggest assets of an organisation that propels its growth. This argument complicates the matter in that organisations depend on the output of software users for their growth, while the same users are perceived as high risks as they create mistakes, some which are expensive or difficult to correct. Norman (2013) argues that mistakes will occur when the wrong goal or plan is formed and even if actions are taken, they are part of the error because the actors themselves are inappropriate. Given this background, automated institutions and organizations need to be conscious of the risks the human resource expose to software in the course of duty and therefore, lay firm foundations that would secure the system from violation.

2.5.1 User Rights and Errors

In the computer world, authentication is the process of identifying someone by way of a username and password to give individual rights and privileges of access to a system. The Access right is an individual license authorizing one to use a system to a certain level and this authority can be revoked, denied, extended or limited, depending on user needs and institutional policies. The Access rights are given under specific directions that the user of a system must observe contrary to which would lead to the withdrawal of such privileges, or complete lock-out of the user from accessing certain privileges. Gerhart (2015), while contributing to the need for privileges control, observes that if workers are given default privileges that exceed their job functions, these privileges can be abused. This sentiment shows the need to control users' rights and privileges so as to keep the system safe from abuse.

The software has defined ways in which their users are permitted to log in. Different categories of users have varying rights of access. Users are required to register with usernames and passwords (secret words or numerals or an alphanumeric codes), distinct from each other, and acceptable by the system, to log-in and access data. This is a security measure that mitigates against system abuse by unauthorized persons. However, some challenges are encountered while logging-in especially when the system declines to open on the assumption of wrong username or password, of an existing user. This happens when authorized users have not been

logging-in for quite sometimes because of changes in roles, section re-deployment or where one proceeded for long leave. Whenever any of the circumstances prevail, the system librarian needs to update such user rights as may be desirable. Gerhart, laments that some companies fail to update access privileges for employees who change roles within an organization or resign from service. This negligence is not acceptable because such users would likely come back to sabotage the system in revenge against some objectionable transfers or dismissal from service.

There are instances when system users would want to change their usernames and passwords due to foreseen concerns. In such situations, the user re-registers a fresh sometimes without the help of the system administrator. This implies that someone with unconcealed motive can masquerade in different identities to delete or distort records, and thereafter changing to another user. Maurer (2015) concurs with Gerhart and adds that the system abuse occurs due to supervisors' lack of expertise required to implement security controls, enforce policies or conduct incident response processes.

2.6 Theoretical Framework

The study was informed by the Unsafe Act Model designed by Rajiv Desai. In his model, Desai (2010) refers to human errors as unsafe acts that come as a result of unintended actions and intended actions. Unintended actions comprise of basic errors that arise due to slips and lapses that are brought about by attention and memory failures. Intended actions, he explains, are the deliberate violation of system procedures that are routine, exceptional and sometimes intended to sabotage the software. System violation is one of the most common causes of data loss that infringes on the rules and procedures such that the resulting data is distorted in meaning and may give the wrong state of the business. Violation of rules could arise because of varying reasons such as; (i) the procedures are complex, confusing or difficult to be remembered, (ii) one is in hurry to accomplish task, (iii) unconsciously skipping a process, (iv) one losing alertness against the requirement of tasks that require one to behave in unnatural ways such as staying alert for hours or (v) results from multi-tasking while one is subjected to multiple interfering activities. Besides, violation involves also physical damages of equipment and machines by careless handling, and/or dropping down storage devices by accident or intending to sabotage the system.

The human error, therefore, is an imbalance between what the situation demands, what the person intends and what he/she does. This means it is an inappropriate or undesirable human decision or behaviour that reduces or has the potential to reduce the effectiveness, safety, or system performance.

Thomas and Petersen (2003), acknowledges two types of human errors which are active errors and latent errors. Desai (2010) agrees with Thomas that active errors are cognitive such as mistakes and are also non-cognitive such as slips and lapses, caused by human beings due to carelessness and inattention while working with the software. The causes of the errors are attributed to fatigue, interruptions, stressors, emotions and other environmental factors. Latent errors, Thomas observed, are as a result of system defects related to poor design, poor maintenance, incorrect installations, and inadequate staff capacity to use the system.

Reason (2012), concurs with both by arguing that active errors occur at the point of contact between human and some aspect of system that may include pushing an incorrect button, or ignoring a warning light while latent error is a human error which is made due to systems that are formed in such a way that humans are likely to make these errors, thus they are accidents waiting to happen.

2.7 Conceptual Framework

According to Mugenda and Mugenda (2003), conceptual framework can be described as a hypothesized model identifying the concepts under the study and their relationships. The Unsafe Act Model is relevant to this study because it can examine the various levels of human errors that occur while interacting with software and their causes. It is, therefore, an ideal model that helps to conceptualize the type of human errors and their sources that arise in the use of the AMLIB software in the Egerton University library and therefore provide a solution that can minimize their occurrences.

The following conceptual framework outlines the interactions between the Independent and the Dependent variables and identifies the Intervening variables that define the outcome of the interactions in the use of the AMLIB integrated library management system at Egerton University library.

A Conceptual Framework Showing Variables Interaction

Independent Variable	Intervening Variables	Dependent Variables	Outcome
Unsafe Acts (Intended & Unintended)	• Fraud • Corruption • Sabotage • Staff mistakes • Inattention • Power outages • Viruses • System crash	1. Charging & Discharging Books/Resources. 2. Online Public Access 3. Accessioning, Classification, Cataloguing, & final processing 4. Overdue reminders, overdue fine & book recall. 5. Registration of new users & Clearances 6. Recording and addressing users' complaints	1. System Failure 2. Human Errors 3. Conflicts 4. Services denial 5. Delayed clearances 6. Inaccurate records. 7. Record redundancies.

Fig.2.1: Model of Unsafe Acts inuse of the AMLIB in EU Main library adopted from Desai (2010).

CHAPTERTHREE
RESEARCH METHODOLOGY

3.1 Introduction

This chapter discusses the research methodology used in this study. It covers the research design, target population, sample size, data collection instruments, research procedures, data analysis, and data presentation methods.

3.2 Study Location

The research was held at Egerton University-Main Campus Njoro which is located about 25kms west of Nakuru Town, Kenya approximately 170km west of Nairobi, the capital city of Kenya. Egerton University is a public institution that, through teaching, research and extension, generates and disseminates significant knowledge that contributes to, and innovatively influences national and global development. The E.U. library supports the University to achieve this mandate by supporting teaching, learning and research needs through providing ready access to information, disseminating relevant information resources and giving quality user-centred services. The library is located on the University's main campus, adjacent to the University administration block. The study explored various human errors caused by staff while processing information resources and during their circulation to users, and also identified the sources of those errors. Lastly, the study examined the library staff skills and knowledge in working with the AMLIB library management software.

3.3 Research Design

This research made use of a case study research design to gather data from respondents given the research objectives. It's a case study on the performance of the AMLIB software at Egerton University library, whose choice was informed by the many complaints raised by library users regarding the inaccuracies of their AMLIB software accounts. The design helped to collect data from selected sample groups by way of administering questionnaires and undertaking interviews. The responses were summarized through descriptive statistics. The design helped to understand patterns of activities that lead to occurrences of human errors and it was suitable because it allowed the collection of quantifiable data from the sample population and provided an opportunity for

interaction between the researcher and the participants in collecting data that described events and attitudes. The study comprises both quantitative and qualitative data

3.4 Target Population

The target population consisted of Egerton University library users, and library staff. The population was approximately 14,000 (Fourteen Thousand) library patrons, comprised of; Academic Staff, Non-Academic Staff, Library Staff, Post Graduate Students and Under-Graduate students. The following is a Table indicating the target population in each stratum.

Table 3.1: Target population

Strata	Population
Academic Staff	491
Non-Academic Staff	324
Library Staff	78
Postgraduate students	718
Undergraduate Students	12,410
Total	**14,021**

Source of data: The AMLIB Software database 2017.

3.5 Sampling Procedures and Sample Size

Sampling is the process of selecting the participants to be studied from the target population. Kothari (2008) defines sampling as the process of obtaining information about the entire population by examining only part of it. The sample population selected had relevant characteristics and the number was representative of the population. A sample population of 156 persons was obtained by using a formula provided by Nassiuma (2000), shown below.

Where:

C = Coefficient of Variation

e = Standard error.

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Therefore, C = 25%, e =0.02, N = Target population (14000) and n= Sample size

$$n = \frac{NC^2}{C^2 + (N-1)e^2}$$

$$n = \frac{14000x0.25^2}{0.25^2 + (14000-1)0.02^2}$$

$$n = \frac{1025.6875}{6.564025}$$

n=156.258

n=156 (Sample size)

Purposive sampling was used to select 50 library participants out of 78 staff who form part of the sample population of 156 participants. The sampling method was used to select the key informants in the library who are the main users of the AMLIB software. However, proportional sampling was done on the remaining 106 respondents on the academic staff, non-academic staff, postgraduate and undergraduate students. To calculate the proportional representation in each stratum, Nassiuma's formula was used, as shown below.

$$nh = n\frac{N_h}{N}$$

Where n is total sample population, nh is the sub-sample for each stratum, Nh is the population in the stratum and N is the target population.

Academic staff = $106x \dfrac{491}{14021} = 3.7 = 4$

Non-Academic = $106 x \dfrac{324}{14021} = 2.8 = 3$

Postgraduate = $106 x \dfrac{718}{14021} = 5.48 = 5$

Undergraduate= $106 x \dfrac{12410}{14021} = 93.8 = 94$

The samples were stratified as follows:

Table 3.2: Proportional Sample Population.

Strata	Proportional Sample Population
Academic Staff	4
Non-Academic Staff	3
Library Staff	50
Postgraduate Students	5
Undergraduate Students	94
Total	**156**

3.5.1 Sampling the Sample Strata

The study adopted the probability sampling method where every member of the population had an equal chance of getting selected as a study subject, and it was assumed that all respondents matched the characteristics of the total population. The responses from the sample population were generalized to imply responses of the entire population.

Egerton University (E.U) comprises of nine faculties namely; Faculty of Agriculture, Faculty of Science, Faculty of Education and Community Studies (FEDCOS), Faculty of Arts and Social Sciences (FASS), Faculty of Engineering and Technology, Faculty of Environment and Resources Development (FERD), Faculty of Health Sciences, Faculty of Commerce and Faculty of Veterinary Medicine and Surgery. Five faculties, namely FASS, FEDCOS, Health, Commerce and Veterinary were not selected for participation because they have faculty libraries located within and outside the E.U main campus. It was assumed the respective faculties' members could not provide significant input to this study because they rarely used the E.U. main library. Selected participants were reached through their departments by way of visits by the researcher.

Non-academic staff included all University staff that are not engaged in teaching excluding the library staff. Since 50 library staff are non-academic and were selected specifically because of their work engagement with the software (purposive sample), the additional three (3) non-academic staff were randomly selected. Five (5) postgraduate students were proportionally selected to participate in the study.

A proportional number of ninety-four (94) undergraduate students were randomly selected across faculties. These are the majority members as shown in the AMLIB database 2017.

3.6 Data Collection Instruments

The study used two sets of questionnaires and interview schedules to collect data from the respondents. The instruments were ideal for this study because the sample population of library staff was large and hence questionnaire was ideal in terms of reaching out to many participants, high response rate and time saving, among other benefits. Interview sessions were suitable in engaging senior library staff who were key informants in the research study. The first set was questionnaire for library staff that was administered to 45 respondents and an interview held with5 library senior staff.

The second set was questionnaires for library users that were administered to 90 respondents while 19 respondents were interviewed as shown in Table 4.3 and Table 4.3.1 respectively. The questionnaires are suitable for the study because it achieves high rate of responses, engage many participants at short notice, and the participants are given adequate time to respond to the questions. Interview schedule is also suitable when a few respondents are engaged because it gives the researcher an opportunity to clarify a query, the respondents' freedom to give independent opinion free from influence of other respondents and the investigator enjoys one-to-one conversation with the participants of the study, which give the researcher a better understanding on the area of study.

The interviews were undertaken to approximately 19 participants of the total sample population that covered the key informants of this study. The interview aimed at acquiring more information that could be relevant to the study, particularly from the key informants. Data is found within the minds, attitudes, feelings, or reactions of people. This fact made the interviews better suited to collect inherent data from respondents and had the advantage of a high rate of response. Interview questions were simple and allowed the interviewees to freely volunteer any information they deemed necessary.

The instruments helped to collect and analyse data from respondents in the following key areas; hours of operations that staff are required to put while using the AMLIB software per day,

qualification and training level, common errors encountered, level of ease while using the AMLIB software, types of complaints by library users, controls and rights of access, frequency of database cleaning and possible suggestions on error mitigations.

3.6.1 Reliability and Validity of Research Instruments

Pretesting of research instruments was carried out at Kenya National Library Services (KNLS), Nakuru Kenya, to determine the relevance and appropriateness of the questions asked as well as to identify ambiguous questions in the questionnaires so that they could be expunged or corrected. KNLS library was chosen for the test because it uses the AMLIB software to process and circulate information resources to library users. The pre-test group was selected using simple random sampling and comprised 10% of the sample size. According to Hertzog (2008), 10% of the sample required for full study should be used in a simple size. The test was necessary to measure the validity and reliability of the research instruments.

Validity, as discussed by Creswell (2006), is the degree to which a measurement instrument or approach is successful in quantifying or describing the elements under the measure. This study adopted the construct validity that is explained by Kombo and Tromp (2011), as a measure of how an instrument is credible such that it corresponds accurately to what it is purported to measure. The instrument was tested, and the responses received were found to measure the construct of interest by providing relevant data for this study.

Reliability, as explained by Bhattacherjee (2012), determines whether an instrument used for assessment provides similar results every time it is used in similar settings with similar subject types. Reliability in this study was used to determine if questionnaires used provided the same results if repeated or in a similar setting with the subject type, i.e. the internal coefficient. In this study, few Likert questions responses were analysed through the Statistical Package for Social Sciences programme (SPSS) version 21. Cronbach's Alpha method on internal consistency was used where the alpha values used are between 0 and 1. Creswell (2007), provides that a correlation coefficient ranging between 0.7 and 0.8 is acceptable reliability value.

This study had a reliability value of 0.7, where the findings on the questions on; Staff Training had Cronbach reliability alpha of 0.762, Staff Supervision had Cronbach reliability of 0.732, Staff Fatigue had Cronbach reliability of 0.779 and Poor System Interface had Cronbach reliability of 0.731. The Cronbach Alpha result indicated that the instruments were reliable and required no amendments.

Table 3.3 Cronbach Reliability Alpha

Construct	Cronbach's Reliability Alpha
Staff Training Assessment	0.762
Staff Supervision	0.732
Work Fatigue	0.779
System Interface	0.731
Average	**0.743**

3.7 Data Collection Procedure

The researcher used the "drop" and "pick" method to administer research questionnaires to participants who the researcher met inside and outside the library. Participants were left with copies of questionnaires to fill for a period not exceeding three days after which the researcher went back to pick them. Interview sessions were held at locations the participants chose that gave them privacy and freedom to answer questions and express their independent opinions. Key terms mentioned concerning concepts were recorded down against their frequency of mention. The Library Users' Complaints Register was examined and data that was relevant to this study were extracted for analysis.

3.8 Data Analysis and Presentation

Descriptive statistics were used to analyse quantitative data. Most of the data obtained were nominal. A computer-based programme known as the Statistical Package for Social Sciences (SPSS) was used to analyse quantitative data which was presented in tables, graphs, and charts. Qualitative data collected through interviews were coded. Coding according to Rossman& Rallis (2011), is the process of organizing text data into categories or segments where the segments are coded with terms in the natural language of participants.. Interview questions were transcribed into

some set codes that represented key terms used by the participants in their natural language that facilitated ease of understanding, analysing and reporting of the results.

3.9 Ethical Considerations

Ethical issues are morals that control behaviour or the way an individual conducts himself or herself. Ethics act as guidelines that assist the researcher to research under professionalism. The ethical considerations in this study included:

Permission – Seek for permission by way of written applications from all relevant Kenya government departments and institutions such as National Council for Science, Technology and Innovations (NACOSTI), Ministry of Education, Provincial Administration and Egerton University so that to permit data collection for this research.

Confidentiality- The researcher ensured that the information and personal opinion that was given by the respondents was held with the confidentiality it deserves to respect the integrity of the respondents. The researcher assured the respondents that the information they gave remained confidential and was used for academic purposes only.

Intimidation – The researcher ensured that the respondents were not intimidated by the use of professional jargon or by how the questions were posed but rather created a friendly environment that gave them the freedom to remain or withdraw from participating in the study.

Psychological harm – The researcher was careful to avoid causing physical or psychological harm by ensuring the use of safe language that would not cause embarrassment, apprehension or repugnance to respondents.

Plagiarism- This is false attribution of ideas and involves unauthorised use or copying of someone else's work without acknowledging the owner by way of citations. The researcher cited all works used as sources of literature as a matter of honesty and originality as well as a way of appreciating and acknowledging the writers.

Principle of voluntary Consent – The researcher confined the study to this principle where the participants willingly participated in the study after disclosing to participants the reasons for the research and the intended use of the research findings.

Privacy- The respondents were advised not to reveal their identities on the questionnaires to ensure their utmost privacy. However, the respondents were fully informed about the research procedure and were at liberty to give consent to participate before data collection took place.

CHAPTER FOUR
RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents and discusses the results obtained from the study. It covers the descriptive statistics on the types, sources of human errors and staff skills in the use of the AMLIB software at Egerton University Library, Njoro.

4.2 Descriptive statistics

This section presents the analysed data, presented in tables, graphs, and charts. The data comprises the demographic data about the respondents, types of human errors found in the AMLIB system, the sources of human errors, the skills and knowledge gap by the library staff and the effects of the errors on the OPAC and library users' database. The library users includes the academic and non-academic staff, postgraduate and the undergraduate students in Egerton University main library.

4.2.1 Demographic characteristics of the respondents

This section presents the demographic characteristics of the respondents, the hours worked daily with the AMLIB software and the period of service in the library by each staff.

4.2.2 Response rate

The researcher administered 136 questionnaires to a structured sample of; 2 academic staff, 2 non-academic staff, 45 library staff, 3 postgraduate and 82 undergraduate students as per the sample sizes shown in chapter three. Out of 136 questionnaires, 123 were responded to while 19 interviews were held to; 2 academic, 1 non-academic, 5 library staff, 2 postgraduate students and 9 undergraduate students. Table 4.3 and Table 4.3.1shows the response rate which was above 90% across all the categories for both questionnaires and interviews. As noted by Babbie (2004), a response rate of 70% and above is deemed very good, thus 90% response was sufficient.

Table 4.3 Response rate on Questionnaire

Category	Target respondents	Successful	Response rate (%)
Academic Staff	2	2	100
Non-academic staff	2	2	100
Library Staff	45	41	89
Postgraduate students	3	3	100
Undergraduate Students	82	75	90
Total	**136**	**123**	**90**

Table 4.3.1: Response rate on Interviews

Category	No.of Respondents	Successful	Response rate(%)
Academic Staff	2	2	0
Non-academic staff	1	1	0
Library Staff	5	5	100
Postgraduate students	2	2	100
Undergraduate Students	10	9	90
Total	**20**	**19**	**95**

4.2.3 Period of Service in the Library

The results in Table 4.4 show that the majority of the staff respondents (90%) had worked in the Library for three years and above while 6% had worked for two years and 4% had only worked for one year. These results indicate that the Egerton University Library is dominated by employees who were there since and before the installation of the AMLIB software and this implied that they were in a better position to realise the tangible changes between the manual system and software-assisted library system. It also shows that staff have acquired good experience in working with the AMLIB software. The results are also clearly shown in Figure 4.1.

Figure 4.1 Period of Service

4.2.4 Daily Hours Working with the AMLIB Software

According to results in Table 4.4, majority of the staff respondents (59%) worked using the AMLIB software for eight hours daily, followed by those who worked for seven hours (15%), those worked for six hours (10%), for five hours (7%) and finally those who worked for 9,4,3 and 2 hours (2%) respectively. This in general, is an indication that in normal working hours, library staff use the AMLIB software to perform their daily duties in the Library. It also shows that many staff work for long hours, doing a repetitive job without a break which can cause fatigue. The results can also be seen in Figure 4.2.
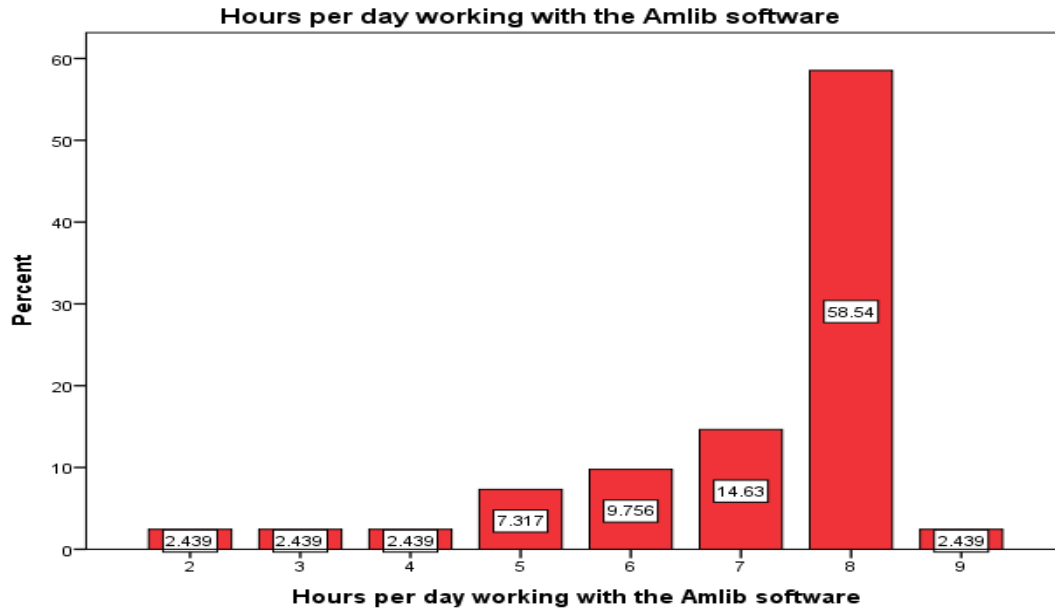
Figure 4.2 Hours worked with AMLIB per day

4.2.5 Distribution of Library User Categories

Findings presented in Table 4.4 show that the main users of the library in Egerton University Library were undergraduate students (85%) followed by non-academic staff (7%) and then the postgraduate and academic staff at 4%.

4.2.6 Borrowing of Information Resources from the Library

As shown in Table 4.4, 88% of the respondents, both staff and library users, borrowed information resources from the library to use them outside the library and only 12% (9) did not borrow information resources out of the library but used them within the library. The findings imply that undergraduate students are the majority users of the Egerton University Library and are therefore likely to suffer more than any other group from inadequate library services, hence the relevance of this research. The findings are summarized in Figure 4.3.
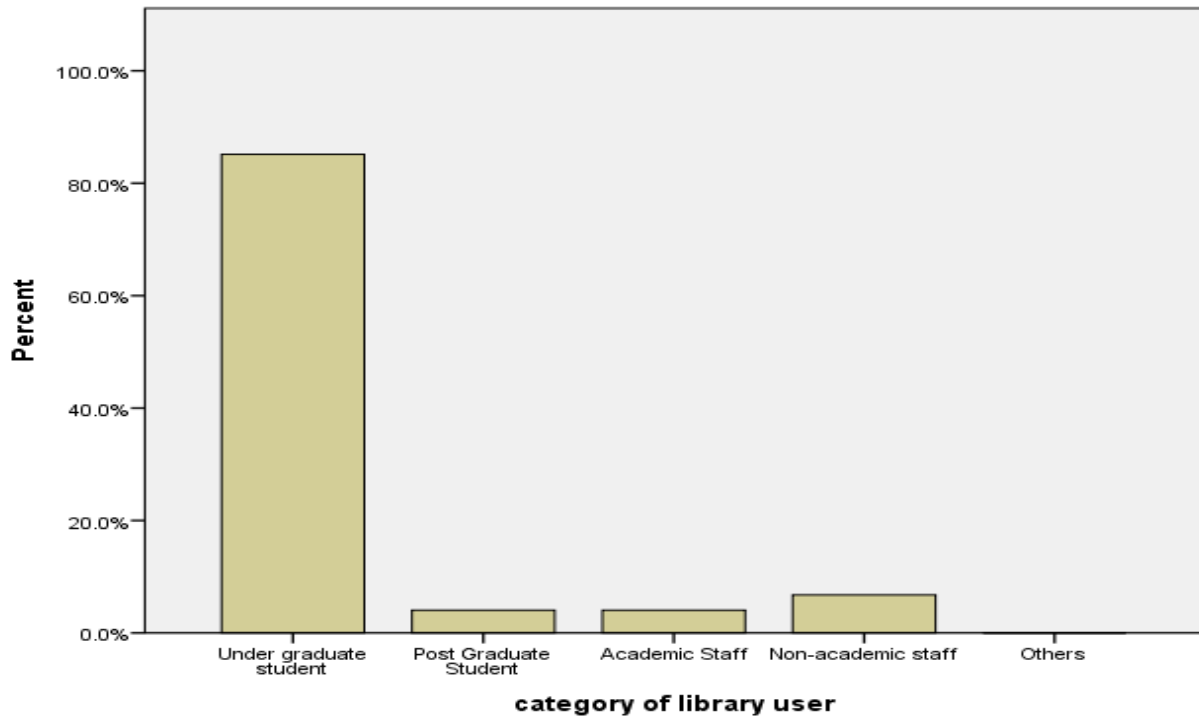
Figure 4.3 Category of Library User

Table 4.4 Demographic Characteristics of the Respondents

Characteristics	Responses	Frequency	Percentage (%)
Period of Service in the Library	One year	2	4.2
	Two years	3	6.2
	Three years and above	43	89.6
	Total	48	100
Hours per day with AMLIB	2	1	2.4
	3	1	2.4
	4	1	2.4
	5	3	7.3
	6	4	9.8
	7	6	14.6
	8	24	58.7
	9	1	2.4
	Total	41	100.0
Library User Category	Undergraduate student	63	85.1
	Postgraduate student	3	4.1
	Academic staff	3	4.1
	Non-academic staff	5	6.8
	Total	74	100.0
Library Borrowers	Yes	65	87.8
	No	9	12.2
	Total	74	100.0

4.3 Types of Human Errors

The study revealed that the AMLIB system in E.U. Library is reported by both library users and library staff to have many challenges encountered in the use of the library services and in the management of library database as discussed in Table 4.5.

4.3.1 Users Encounter with Types of Errors in the Use of AMLIB Software

Results in Table 4.5 show that 50% (37) of the library users encountered problems relating to wrong data entry in the OPAC that differed from the actual library document. Secondly, from Table 4.5, 55% (38) of the respondents agreed that there existed some data redundancies in the OPAC, 26% (18) reported that there were many data redundancies and only 16% (12) reporting no data redundancies in the OPAC. Lastly, Table 4.5 indicates that the majority of the respondents (84%) had official complaints regarding their loan status in the library whereas only 16% had not.

Table 4.5 indicates that the types of errors committed by the library staff are the error of commission (53.8%) and the error of omission (31%). Additionally 26% (18) observed there were data redundancies in the OPAC which led to many of them (84%) recording official complaints regarding their loan status. The errors of commission (where right entries refer to wrong documents or wrong users) and error of omission (where documents/data are omitted from an entry such that some documents/files are not found by searchers or are identical with others) do exist. Redundancies occur where a single entry is duplicated with minor changes or no changes in the OPAC. These are major types of errors encountered while using the AMLIB software.

The presence of the errors(Commission, Omission and Redundancies) were confirmed by the library staff interviewed who generally agreed that the errors emanate from long working hours while using the AMLIB software, failure to capture whole data at the processing stage, mixing up data, forgetting to save new data, lack of system warnings, pressing wrong key such as delete instead of update, creating new files instead of updating existing files, not taking action where required but instead closing down the system module and, logging-off the system without following the procedure.

Table 4.5: Types of Human Errors Reported by Library Staff and Library Users

Types of Error	Responses	Frequency (no.)	Percent (%)
Problems in wrong data entry at the OPAC	Responses		
	Yes	37	50.0
	No	37	50.0
	Total	74	100
Data redundancies in the OPAC	Responses		
	None	13	18.8
	Few	38	55.1
	Many	18	26.1
	Total	69	100
Users complaints regarding loan status	Responses		
	Yes	62	83.8
	No	12	16.2
	Total	74	100
Common errors while using AMLIB software	Responses		
	Errors of omission	12	30.8
	Errors of commission	21	53.8
	Both errors are encountered	6	15.4
	Total	39	100

4.4 Sources of Human errors

The findings in Table 4.6 indicate that the majority of the library staff (73%) interact with AMLIB software without seeking assistance, 8% do not seek assistance while 19% sometimes sought assistance. A visual representation of this outcome can be seen in Figure 4.4.
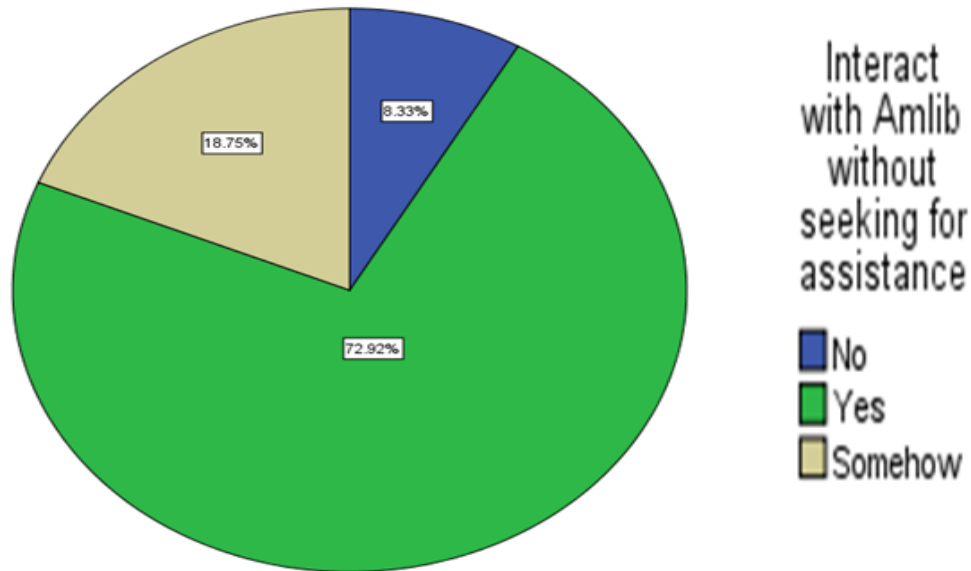
Figure 4.4 Ability to interact with AMLIB software

Figure 4.4 shows that 73% of the library staff are conversant with the AMLIB software and can operate the software without seeking assistance. This familiarity is, however, limited to specific modules commonly used by staff in respective sections of the library but it is not an indication of the library staff's ability to work with all AMLIB modules. This also applies to the 19% library staff who are not very sure and 8% who are not conversant working with the AMLIB software.

Similar observations were reported by the staff interviewed who agreed that they were not able to work with all the AMLIB modules because of their current section work requirements. They also reported that staff are assigned to work in one section for a period of three (3) years and above, and therefore lack exposure to other modules in other sections. This implies that when a staff gets transferred to other sections, a lot of errors are introduced to the database before one becomes familiar with the modules in the new section.

Table 4.6 shows some challenges faced by library users in the use of the library services. Amongst the library users, majority (78%) had at one time been denied loan of library documents due to the inaccessibility of their files while 22% were not denied. Library users sometimes get delayed in getting served or cleared due to perennial anomalies at the circulation desk as indicated in Table

4.6. The table shows that 63% of the respondents have experienced delays while 37% have not. Library users could not agree or disagree on whether there were recurrent power interruptions that delayed services from the library. Lastly, the finding shows a significant (54%) of the respondents not able to access and verify data in their accounts whenever they wanted although (46%) said they accessed their accounts anytime they requested. This explains that users could remain unaware of their wrongly surcharged accounts until such time of clearing with the library when it is brought to their attention, resulting into conflict between them and the library staff.

Table 4.6 Identified Challenges Facing Library users

	Yes (%)	No (%)	Somehow (%)	Total %
Interact with AMLIB without seeking for assistance	2.9	8.3	18.8	100
Users denied loan of document due to inaccessibility of file	78.4	21.6	0	100
Users get delayed in getting served or cleared due to some anomalies at the circulation desk	63.0	37.0	0	100
There are recurrent power interruptions that delay users from receiving services	50	50	0	100
Users able to access and verify their accounts anytime they want to	45.9	54.1	0	100

4.4.1 Period of Services against Errors

The results in Table 4.7 indicate that 14 of the respondents who had worked in the library for one year, sometimes made errors while 14 others often made errors while processing information materials. This was the same case with the respondents who had worked for two years whose majority (seven) sometimes made errors while two rarely made errors while processing information materials. On the other hand, none of the respondents who had worked for three years and above ever made errors, three rarely made errors, 15had rarely made errors and at least one. In conclusion, therefore, the results in Table 4.7 imply that most of the errors made were attributed to the staff who had worked for less than three years. This indicates that the more years of

experience, the rare the occurrence of the errors. However, staff who worked for over three years are not exonerated from having made errors before gaining work experience. The errors are witnessed in the OPAC and other library databases.

Table4.7 Period of Service against Errors

	Make errors while processing information materials				
Time worked in library	Never	Sometimes	Rarely	Often	Total
One year	6	14	14	1	35
Two years	0	7	2	1	10
Three years and Above	0	0	3	0	3
Total	6	21	19	2	48

4.4.2 Interaction with the AMLIB system

Findings from Table 4.8 show that the respondents who had worked in the library for two and three years interacted with AMLIB without seeking assistance respectively. On the other hand, majority (35) of those who had worked for three years and above interacted with the AMLIB without seeking assistance, while nine of the respondents were somehow able to operate the AMLIB software without seeking assistance. Lastly, only four of the respondents were unable to interact with AMLIB without seeking assistance. A conclusion can be drawn from these data that the library staff members interact with the AMLIB without being assisted regardless of the period of service in the library. This could be a source of errors because their performances go unchecked or unverified. This is a misconception by managers that staff understands the operations of the system.

Table 4.8: Ability to Interact with AMLIB Against Period of Service in Library

| | Interact with AMLIB without seeking for assistance | | | |
Time worked in library	No	Yes	Somehow	Total
One year	0	2	0	2
Two years	0	3	0	3
Three years and above	4	30	9	43
Total	4	35	9	48

4.4.3 Category of Staff that Enters Data into the AMLIB System

The entry of data into the AMLIB system is mainly done by the mid-level library staff while only a few of the junior/clerical staff are involved, as represented in Figure 4.5.
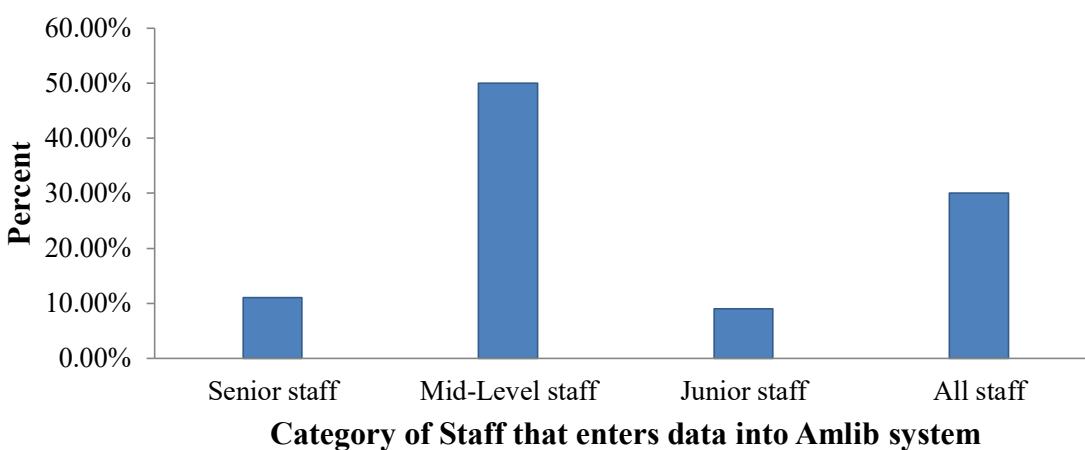
Figure 4.5 Category of staff that enters data into AMLIB System.

From Table 4.9, 50% (23) of the staff that enters data into the AMLIB system are mainly the mid-level staff category (diploma &degree holders), 11% (5) are senior staff (masters level) while 9% (4) are junior staff (certificate). The findings also indicate that the respondents who sometimes made errors and those rarely made errors while processing information documents were equal (19). Six (6) respondents had never made errors and only (2) often made errors.

It is also clear that the mid-level staff and the senior staff were often making errors while processing information documents. This concludes that errors are committed by all staff across the board irrespective of their academic backgrounds.

It was confirmed by majority staff interviewees that in addition to all staff getting engaged in data entry**,** the In-charge Technical Services and Readers' Services divisions were responsible for verifying the data entered into the system. However, few staff interviewees said that there was nobody assigned to do the verification of data entries. This is contrary to the fact that data verification is an oversight role for the supervisors that need to be taken seriously to ensure correct data is entered into the AMLIB system.

Table 4.9: AMLIB Data Entry Against Making Errors

AMLIB Data Entry	Make errors while processing information materials				Total	Percent %
	Never	Sometimes	Rarely	Often		
Senior staff	1	0	3	1	5	11
Mid- level staff	5	8	9	1	23	50
Junior/Clerical staff	0	1	3	0	4	9
All staff	0	10	4	0	14	30
Total	6	19	19	2	46	100

The findings in Table 4.10 show that most attachees are never given the AMLIB access rights (33) even though minority (3) is given access rights. On the other hand, Table 4.10 shows that the attachees made errors of commission (21), and those of omissions (12) and a few (6) were said to have made both errors that have a negative impact on the library services and its databases.

Table 4.10: Common Errors by the Attachees on the AMLIB Access Rights

	Attachees are given AMLIB access rights				
Common errors	No	Yes	Do not know	Total	Percent
Errors of omission	11	1	0	12	31
Errors of commission	19	2	0	21	54
Both errors	3	0	3	6	15
Total	33	3	3	39	100

4.4.4 System Error-Defence Mechanism

There is an error defence mechanism in the AMLIB software as indicated in Figure 4.6. The majority of respondents (69%) affirmed the statement that there was an error defence mechanism in the AMLIB software while (31%) denied that the defence mechanism existed. However, a quick check on the system shows that the defence mechanism is discriminately applied such that it is missing in many instances implying that users of the software are not protected from making errors.
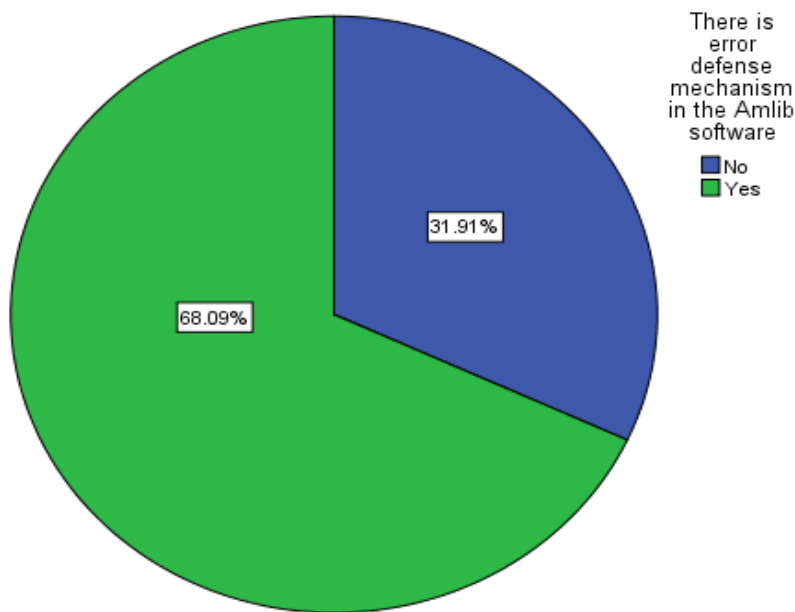
Figure 4.6 Presence of System Error Defence mechanism

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4.4.5 User Friendliness

From the findings in Figure 4.7, the majority of the respondents (53%)agreed that the AMLIB software was user-friendly while 19% strongly agreed. 9% strongly disagreed that the software was user-friendly while a further 9% were neutral.
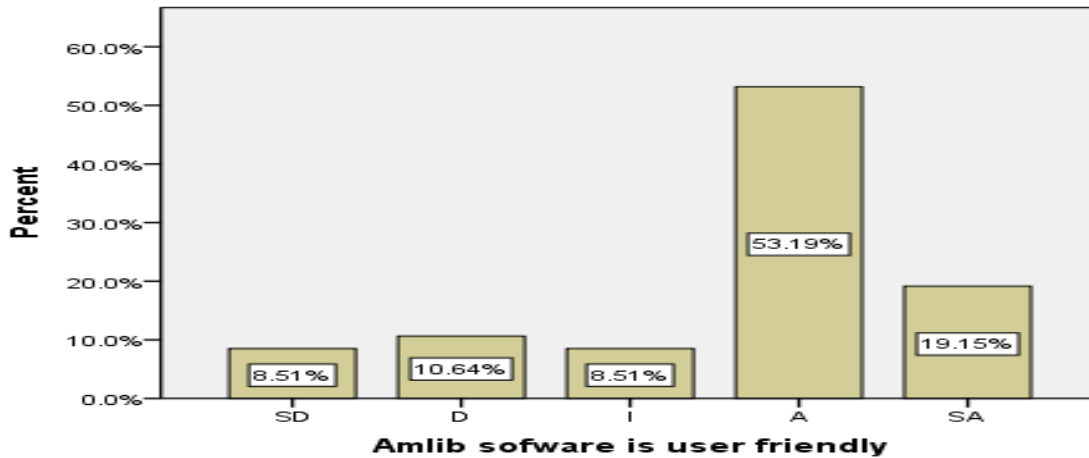
Figure 4.7: User-Friendliness of the AMLIB software

4.4.6 The AMLIB Symbols

Interpreting meanings of AMLIB symbols is generally easy for 38% of the respondents as indicated in Figure 4.8 although 34% of the respondents were not sure.13% indicated that it was difficult, 11% indicated it was very difficult whereas only 4% agreed it was very easy. This implies that it is both easy and difficult for the AMLIB users to interpret the AMLIB symbols as said by respondents. The implication of these positive responses is bias that the respondents gave honest opinions that are solely dependent on the modules one has been exposed to in their line of duty.

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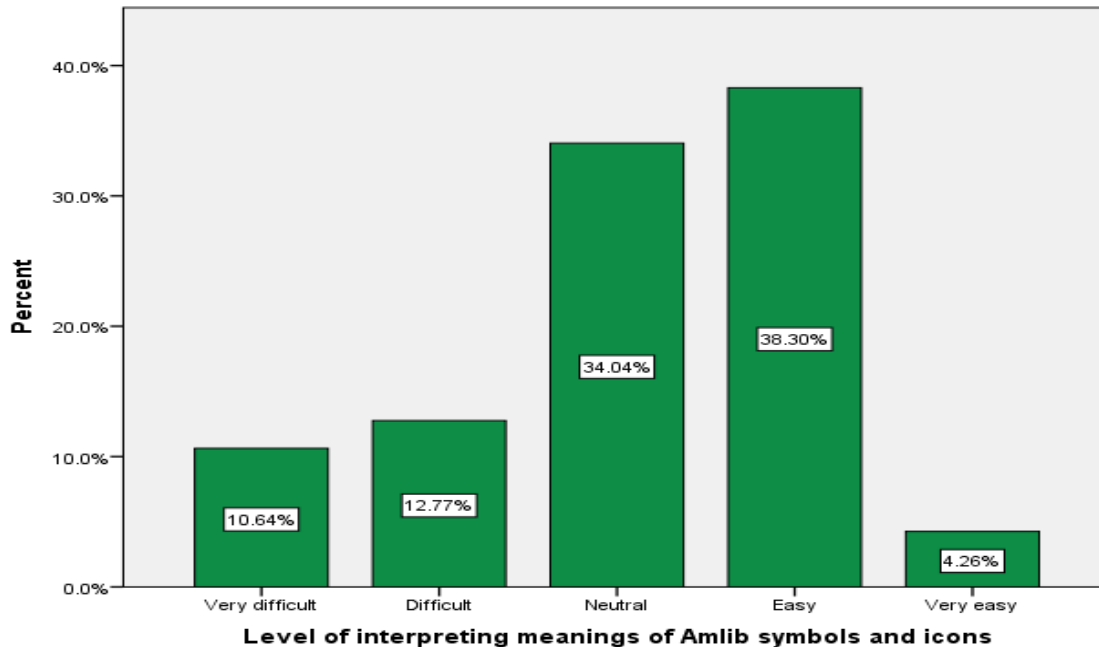
Figure 4.8: Level of interpreting meanings of AMLIB symbols and icons

4.4.7 Causes of Services Delays

The non-library staff were asked to provide their opinion on causes of delays in the library and the respondents identified the following causes; long processes in identification of users/resources (13%), slow network (13%), many users in the waiting line (12%) and spoilt book bar codes (12%).Others were; some library materials missing in the database (12%), delays due to staff consultations (11%), slow staff in the library (10%), lack of identity cards amongst some library users (9%), missing of borrower data in the AMLIB system (7%) and lastly, other causes (2%). In summary, causes of delays are shared between those caused by errors in the database (40%) and those attributed to system complexity (38%). These results can be observed in Table 4.11.

Majority of the staff interviewed observed that the AMLIB procedures were easy to follow and use while few reported that the procedures were difficult to remember and use. Also the respondents generally agreed that the AMLIB manuals were not readily available for the library staff to refer to in cases of challenges and therefore become one factor contributing to the major library services delays.

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Table 4.11: Identified Causes of Long Queues in the Library

Causes	No.	Percent
Few staff	31	10.2%
Many users waiting	37	12.2%
Long processes in identifications	40	13.2%
Slow Network	38	12.5%
Materials missing in the database	36	11.8%
Spoilt borrower/book bar codes	37	12.2%
Staff consultations	32	10.5%
Borrower data missing	22	7.2%
Lack of identity card	26	8.6%
Others	5	1.6%
Total	304	100.0%

4.4.8 Reasons for Occurrence of Errors

The findings presented in Table 4.12 indicate that a majority (38%) of the respondents agreed that staff fatigue contributed to the occurrence of human errors while only (12%) disagreed. The majority of the respondents (25%) on the other hand, strongly agreed that negligence contributed to the occurrence of human errors and a minority (14%) neither agreed nor disagreed to the statement. A larger portion of the respondents disagreed that long procedures contributed to the occurrence of human errors. This is represented by a larger percentage (28%) both disagreeing and strongly disagreeing with the statement. Lack of proper training, on the other hand, contributed to the occurrence of human errors with majority of the respondents (30%) agreeing and 23% strongly agreeing. System failure was also another cause of human errors in the library, according to the findings in Table 4.12, with a majority (32%) of the respondents strongly agreeing and (21%) agreeing. It is not easy to relate staff forgetfulness to the occurrence of human errors according to the findings since majority (28%) of the respondents were not sure.

An equal proportion (23%) of the respondents both agreed and strongly disagreed that lack of proper supervision contributes to the occurrence of human errors in the library and only (15%) strongly agreeing to the statement as indicated in Table 4.12. Also, it was noted that an equal

proportion of the respondents (28%) both agreed and strongly disagreed that poor user/AMLIB interface contributes to the occurrence of human errors in the library with only (9%) being neutral.

Lastly, intimidation by long borrowers' queues never contributed to the occurrence of human errors according to the results. The majority (40%) of the respondents strongly disagreed with the statement followed by those who disagreed (30%) while (11%) agreed and strongly agreed respectively and only (9%) of the respondents being unsure.

The interviewee also reported that there were challenges that typify the creation of errors such as sharing of computers, working for long hours that cause eyesores and fatigue, complex system procedures, staff negligence, system violation and system failure due to power surges.

Table 4.12: Reasons for Occurrence of Human Errors in the Use of the AMLIB Software.

Reasons	SA(%)	A(%)	U(%)	D(%)	SD(%)
Staff fatigue due to long working hours	19.0	38.1	11.9	11.9	19.0
Negligence by staff on duty	25.0	22.7	13.6	20.5	18.2
Long system processes and procedures	17.0	17.0	10.6	27.7	27.7
Lack of proper training of system users	23.4	29.8	10.6	21.3	14.9
System failure/ power surges	31.9	21.3	12.8	17.0	17.0
Staff forgetfulness	12.8	23.4	27.7	19.1	17.0
Lack of proper supervision	14.9	23.4	19.1	19.1	23.4
Poor user/AMLIB interface	17.0	27.7	8.5	19.1	27.7
Intimidation by long borrowers' queue	10.6	10.6	8.5	29.8	40.4

Key: SA-Strongly Agree, A-Agree, U- Undecided, D-Disagree, SD-Strongly Disagree)

4.4.9 Erroneous Overdue Charges

The findings in Table 4.13 prove that the occurrence of erroneous charges is mainly contributed by the library staff entering the wrong data into the AMLIB system (21%). System failure and delays in clearing processes are also reasons for the erroneous charges (19%), followed by the status of the loan of a book being entered wrongly in the system (16%). Status of library user records wrongly entered in the system was yet another reason (12%) for the erroneous charges. Staff experiencing fatigue or neglecting to enter part of data or forgetting to clear loans was cited

as another reason of concern (12%), and lastly, both violation of system procedures in data entry and unforeseen reasons leading to the abrupt closure of library were the least reasons for the occurrence of erroneous charges.

Table 4.13: Reasons for the Erroneous Overdue Charges

Variable	Frequency	Percentage (%)
Staff entering wrong data	27	20.8
Status of loan wrongly entered in the system	21	16.2
Status of library user data erroneously entered	16	12.3
System failure and delays in clearances	25	19.2
Violation of system procedures in data entry	13	10.0
Unforeseen reasons to abrupt closure of library	13	10.0
Staff are fatigued, neglect to enter whole data or forgetting to clear loans	15	11.5
Total	130	100

4.5 The Skills and Knowledge Deficiencies in the use of AMLIB software

The findings in Table 4.14 clearly show that the library staff has adequate skill to work with the AMLIB software since a majority of the respondents (62%) agreed to the statement while only (38%) opposed. Also, majority (63%) respondents agreed that some AMLIB modules are hard to use or operate hence indicating a skill and knowledge deficiency in the AMLIB usage. A higher percentage of the respondents (70%) agreed that there were periodic training sessions for the library staff that helped in improving skills and knowledge on the use of the AMLIB system while (30%) said there were no such periodic training at all. In an attempt to know whether the library staff had the right qualifications and skills to work with AMLIB system, the findings shown in Table 4.14 indicate that majority of the respondents (83%) said they had the right skills, (11%) were not sure whether they had the right skills, while only (6%) respondents confirmed not to have the right qualifications and skills. Lastly, Table 4.14 indicates that periodic surveys to evaluate staff performance in all AMLIB areas were never done, as suggested by a majority (62%) of respondents with (29%) agreeing and only (10%) not sure.

The staff interviewed acknowledged that there exist some knowledge gaps between staff performances and the expected output in AMLIB software. They affirmed that gaps are brought about by inadequate trainings, inadequate exposure to many software modules and inadequate staff performance audit. They attributed these inadequacies to limited funds for trainings, static staff reshuffles schedules and the pitiable number of staff in various library sections to carry out system audit/supervision.

Library users were on the other hand satisfied with the library automated user services, as indicated by the findings in Table 4.14 which shows a majority of the respondents (75%) were in the affirmative while only (25%) negated. Also, the respondents agreed that library staff had adequate skills to work with the AMLIB software with a larger percentage (83%) on the affirmative and (17%) on the contrary.

Table4.14: Skills and Knowledge Deficiencies

Variable	Yes (%)	No%	Not sure (%)
Staff have adequate skills in the AMLIB software	617	38.3	-
Some AMLIB modules are hard to use/operate	63.0	37.0	-
There are periodic training sessions for library staff	69.6	30.4	-
Staff qualified to work with AMLIB system	83.0	6.4	10.6
Periodic surveys to evaluate staff performance	28.6	61.9	9.5
Library users satisfied with the library automation	75.0	25.0	-
Users think staff have skills inAMLIB software	83.1	16.9	-

4.5.1 Trainings

From the data collected in respect to frequency of staff trainings, the following were responses received from the participants. The staff training is rarely held since a majority of the respondents (53%) affirmed to this. On the other hand, a significant number of participants (32%) said that the training was held annually whereas about 9% reported that AMLIB trainings were held quarterly. Approximately (3%) said that the trainings were conducted monthly and another (3%) reported that they were never held. From the above data, it is established that trainings are done irregularly, and that the library staff are not aware at what time they are supposed to be trained. Further, it was

revealed that the training is done at library section levels depending on the user needs and hence the reason for the varied timeframe mentioned by the participants.

On the duration of trainings, the responses from interviews confirmed that trainings were held for one week while others said it took three days. The training was conducted by the AMLIB vendor inside the library and at the vendor's premises. From the response, it can be concluded that training of staff on AMLIB modules was irregularly conducted and that the duration of training was dependent on the modules being trained on.

4.5.2 The AMLIB Software Manual

The respondents admitted that lack of AMLIB manuals in staff working areas has deprived staff the opportunity to solve short-term challenges as well as to help in exploring various software modules to sharpen their skills in readiness to work with difficult modules in different sections.

Availability of AMLIB Manuals

7.00%

47.83%

52.17%

■ Yes ■ No ■ Not Sure ■
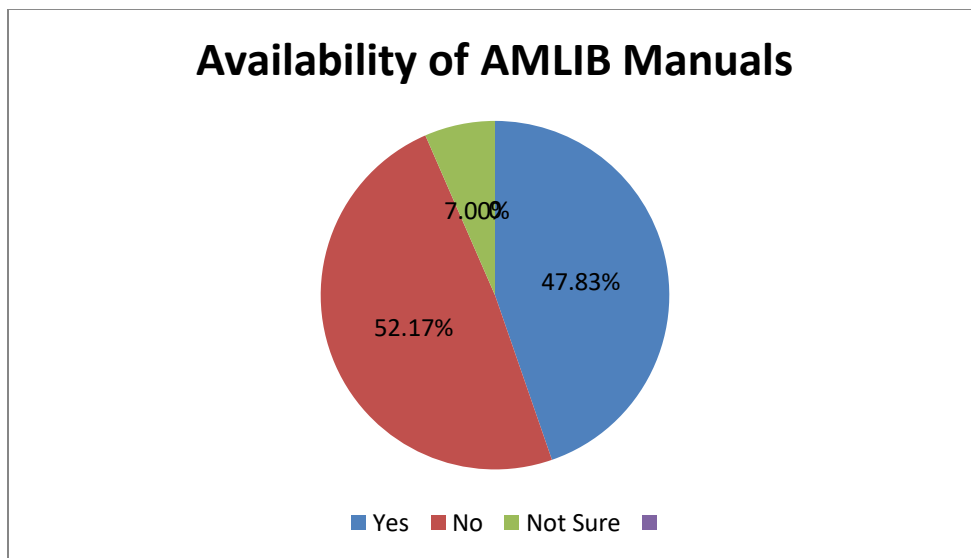
Fig.4.9 Availability of AMLIB manuals

Figure 4.9 above shows that a majority of the respondents (52%) said there were no AMLIB manuals available, (48%) said the AMLIB manuals were available while (7%) were not sure. This indicates that going by the majority response, AMLIB manuals are not available in the library for references.

4.5.3 Circulation Services

Figure 4.10 below shows the comments given by library users about the services provided in that section of the library. Majority participants (54%) said that circulation services provided faster and efficient means of borrowing library materials, and (24%) were of the opinion that the circulation services were slow. In addition, (8%) noted that there were inadequate reference materials available for borrowing hence limiting many students to borrow, while (14%) did not give any comment.

The interviewee confirmed circulation services were going on well. The participants revealed that staff at the library circulation section shares their usernames/passwords with attachees and interns at some point although majority denied. Admittedly, if this practice is in existence, it is a recipe for conflict between staff because library staff whose accounts are found questionable are expected to take responsibility for errors resulting therein oblivious of the fact that the accounts is being shared.

Figure 4.10: Circulation services in the library.

4.5.4 Resource Persons

From the participants' point of view, it is established that the experts from the AMLIB vendor are the key personnel who conduct AMLIB training (40%). System librarians also conduct the in-house AMLIB training (32%) but with limited scope that is dependent on user needs. Other ways used to conduct AMLIB training, as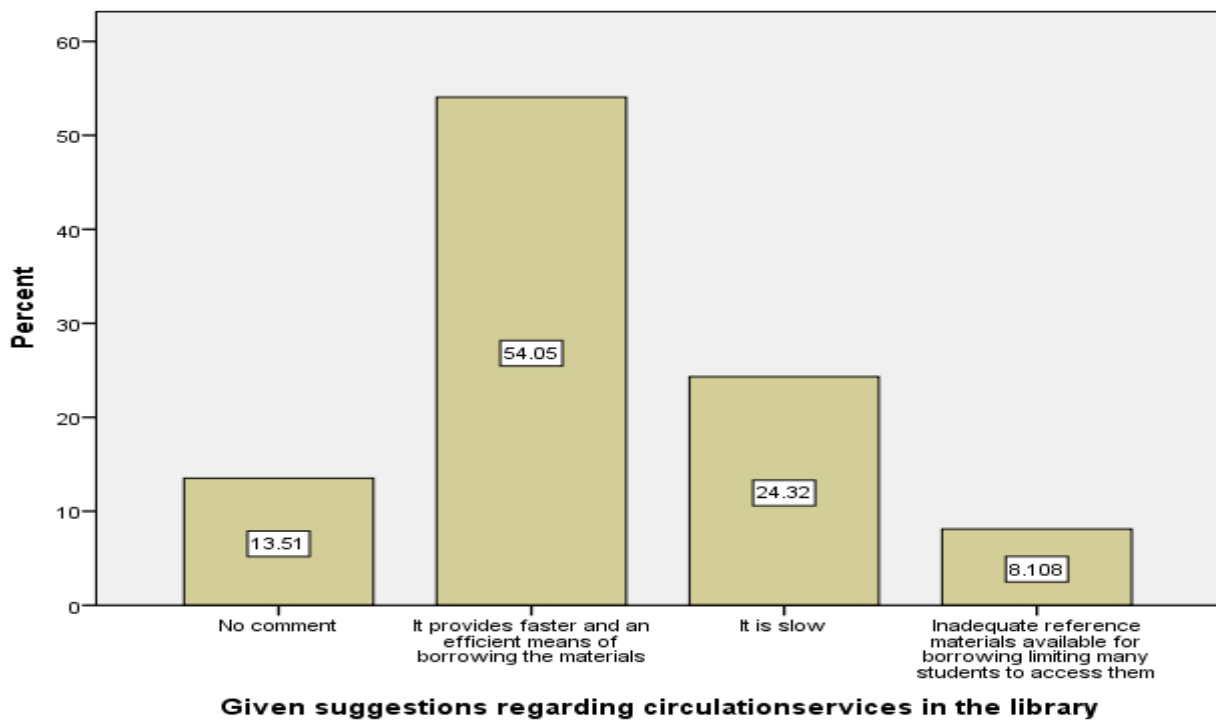 provided by the participants, include; in-house drills (13%), fellow library colleagues (10%) and senior librarians (7%). This indicates that staff training is an on-going activity but in a limited scale.

4.6 Improving Use of the AMLIB Software at E.U Library

Table 4.15 shows some of the AMLIB restrictions that were observed by the staff and the non-staff respondents. The results are explained as follows:

A response of (77%) agreeing that staff are restricted to access some windows in the AMLIB system shows that the system is regulated differently depending on the rank/levels of the employees. Secondly, (96%) of the respondents denied that AMLIB access rights were deactivated when the staff went on leave or off duty indicating that the system access rights were always active. Also, a larger percentage of the respondents (47%) were not absolute on whether or not they sometimes forgot to log off the AMLIB account.

Attachees were never given AMLIB access rights as indicated by the majority of the respondents (81%). On the attachees sharing usernames and passwords to access AMLIB software, majority of the respondents (62%) denied the statement thus, proving that each attachee was given unique username and password to access the AMLIB system. However, they were not allowed to choose the username and password on their own as indicated by majority response (90%) not agreeing with the statement. Further, attachees passwords are not known to other staff working in the library since the majority of the respondents (63%) denied on whether the attachees' passwords were known to other staff.

AMLIB system allowed staff on duty at the circulation desk to issue or clear books from their accounts without supervision as confirmed by a larger response rate of (65%). Also, (72%) respondents affirmed that there is a default code used to waive erroneous overdue charges. The

code was said to be known to only those authorized to waive overdue fines charged on overdue collections.

Similarly, the interview participants observed that the circulation module had a serious weakness in that, library staff were able to issue or cancel loans from their AMLIB accounts since there are no in-built mechanisms in the system that block system users from automatically charging and discharging their accounts. Majority said that this limitation of the software can allow cheating and theft of library documents by dishonest staff. Few respondents did not identify these as an impending threat.

On inaccurate overdue charges, it was reported to occur when the AMLIB system is down caused by system failure or power outages/surges, thereby hindering clearance of returned documents and eventually attracting overdue fines. Affected library users' accounts are sometimes waived from fine payments because of the manual temporary cancellation book in place to support return of library items as shown in Table 4.15. (54%) affirmed that library circulation services section provided an alternative way of issuing and receiving library documents from borrowers. This was one of the measures put in place to support the AMLIB system operation whereas, (86%) of the respondents opined that some errors arise from the loans not pending clearance and harmonization with the AMLIB system database.

AMLIB facilitated stoppage of fines accruing for lost borrowed items effective from the date reported. Majority of the respondents (61%) affirmed to the statement. Pertaining to AMLIB system procedures in the library, a majority (67%) of the library users denied that it took much of their time to be served in the library, indicating that the users were just fine with the procedures in the AMLIB system.

On library memos, the majority of the respondents (86%) had never received a reminder memo demanding return of library document(s) they never borrowed. However, for those who affirmed to have received a reminder memo, (14%), said that staff carelessness in managing users' files was the major contributing factor to such mistakes as indicated in Figure 4.18. Lastly, (93%) of the respondents denied the existence of notification memos sent to them to confirm the clearance of

materials returned on their behalf by their proxies. This identifies the gap that needs to be addressed so that to improve the AMLIB services in updating the library users on their library loan status.

Table 4.15: AMLIB Management Shortcomings that Need Adjustments

Statements	Yes (%)	No (%)	Sometimes(%)
Staff restricted from using some AMLIB modules	76.6	23.4	-
AMLIB user rights surrendered when on leave/off	4.3	95.7	-
Sometimes forget to log off AMLIB account	23.4	29.8	46.8
Attachees are given AMLIB access rights	8.5	80.9	10.6
Attachees share usernames and passwords	26.7	62.2	11.1
Attachees choose their usernames and passwords	10.3	89.7	-
Attachees' passwords known to other library staff	37.2	62.8	-
Staff can issue or clear books from their accounts	65.2	34.8	-
Default code used to waive overdue charges	71.7	28.3	-
Default code used byall staff to waive over-dues	-	100	-
Documents waived from erroneous overdue fine	86.4	13.6	-
AMLIB facilitates stoppage of fines accruing	60.9	39.1	-
Users' time is wasted by to long system procedures	32.9	67.1	-
Users receive reminders memos to return library document(s) they never borrowed	13.9	86.1	-
Library provides an alternative way of issuing and receiving library documents when AMLIB fails	54.3	45.7	-
Notification memos sent to users to confirm clearance of borrowed materials returned by proxies	7.0	93.0	-
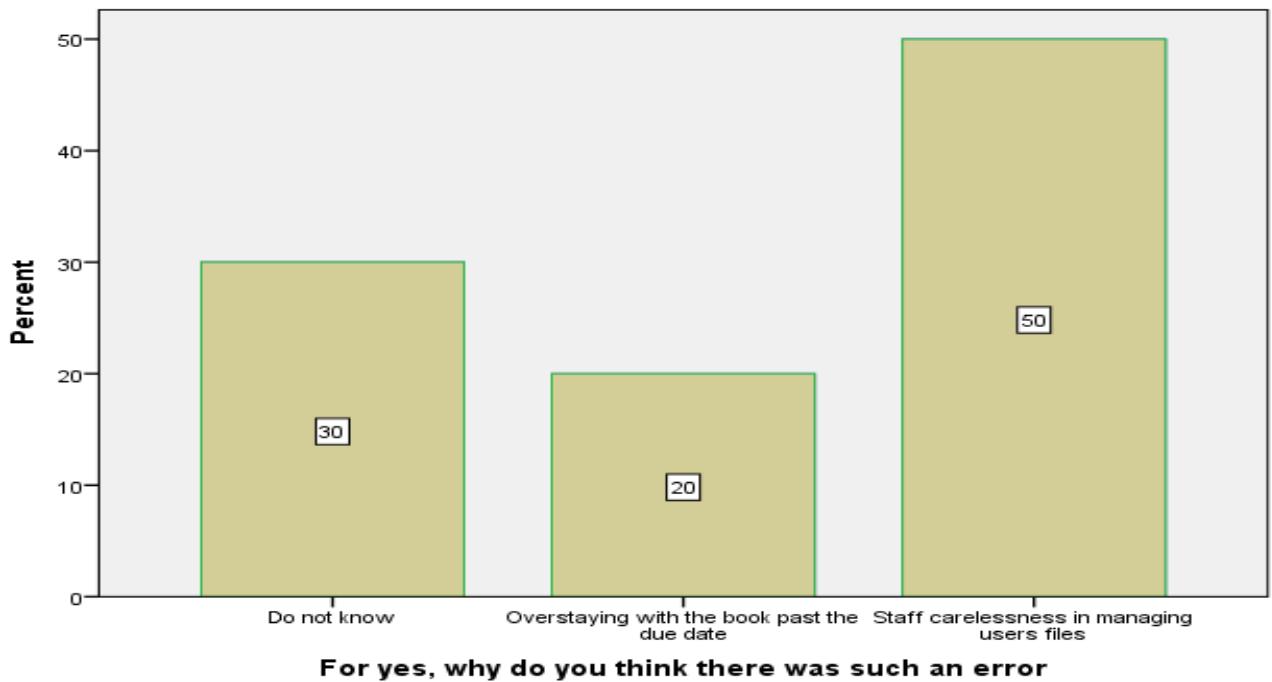
Figure 4.11: Reasons for Inaccurate Memos

Figure 4.11 above explains some of the reasons that emanate from inaccurate claims by the library to library users where staff carelessness was cited by respondents as the major reason (50%), and library users overstaying with library materials beyond their dates of return was second (20%) while a significant number of respondents (30%) seemed not to know the reasons.

4.6.1 Users' Rights Control

The findings shown in Table 4.16 regarding staff restriction in accessing some AMLIB modules that 31% of the respondents felt it was unacceptable while a similar 31% felt it was acceptable. A few (10%) were of the opinion that the restriction was slightly acceptable. From the findings, it is seen that the restriction is acceptable with (52%) respondents in the affirmative while (48%) had a contrary opinion.

Table 4.16: Staff restriction into some AMLIB modules

Received comments	Frequency	Percent%
Unacceptable	13	31.0
Slightly unacceptable	7	16.7
Slightly acceptable	4	9.5
Acceptable	13	31.0
Perfectly acceptable	5	11.9
Total	42	100.0

4.6.2 Default Log-in Code

The results in Figure 4.12 show that majority of the respondents (38%) denied the availability of a default log-in code for staff who forget their usernames or passwords to access the AMLIB software. Approximately 32% of the respondents are aware that there is a default log-in code whereas about 30% were not aware of the availability of a default code. Depending on the recurrent need, default codes should be available but should be zealously secured by the System librarian so that the code is not used to malign or corrupt the system for the benefit of fraudulent individuals.

Figure4.12 Default Access Code to Access the AMLIB Software
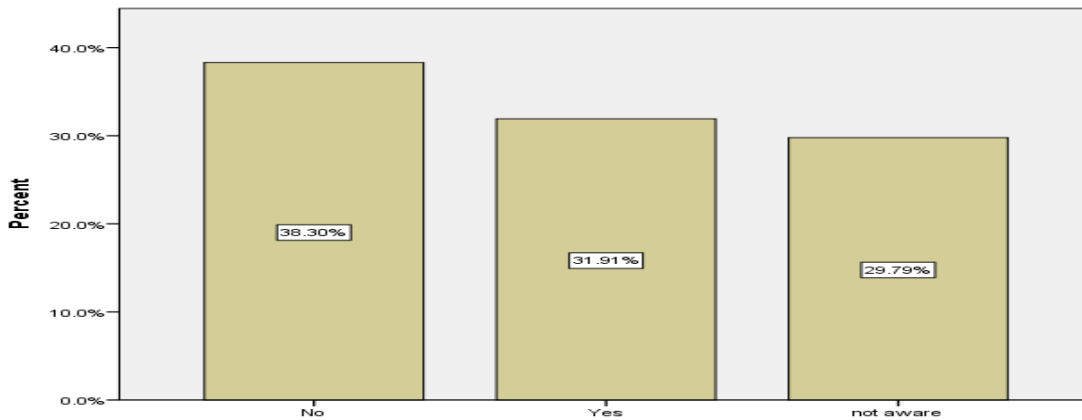
4.6.3 Renewal of User Rights and Passwords

The AMLIB users are not required to renew their user's rights regularly as indicated by the participants. A majority (61%) disagreed that they are required to renew their user's rights regularly. On the other hand, the AMLIB users agreed that they were able to change their usernames and passwords at will; a majority (46%) of the respondents strongly agreed to the claim, while (27%) disagreed and a similar number were not sure. The practice of software users habitually changing their passwords and usernames at will without consent of the system librarian is dangerous as this would create a loophole for system abuse and malpractices that could be counterproductive to the library functionality.

Majority interviewees' participant reported that staff were not obligated to surrender their log-in rights to their supervisors while proceeding on leave or off duty or be renewed afresh upon returning back to work. This is quite risky to the collection as staff with unconcealed motives, while on leave or off duty, might decide to clear, add or delete data, while on a visit, in revenge to unfavorable administrative decision taken on him/her.

Interviewee also affirmed that there was some level of staff dishonesty where they created default usernames and passwords at will, to conceal their identities for fear of victimization for wrong doings. Regarding the rights to change the passwords, the respondents had differing views in that some affirmed that the senior staff have the right to change their user passwords whereas others denied.

4.6.4 Overdue Waivers Determination

As per the results presented in Table 4.17, the majority of the respondents (64%) affirmed that the In-charge circulation determines waivers on overdue fines, although, sometimes it could be done by some specific persons (19%), any staff with the right to do the clearing (13%) or even any staff on duty (4%). The study reveals malpractices at the level of surcharging overdue documents, such that sometimes it is biased or tilted depending on either to whom the overdue fine is being levied or the library staff serving at the library circulation counter at a particular time. However, the underlying score is that overdue waivers confirm that there have been errors in surcharging

overdue fines on library information resources borrowed by users. The wrong surcharges could be attributed to the errors of omission and commission.

Table 4.17: The Person to Determine Waivers on Overdue Fines

Who determines overdue waivers	Frequency	Percent
In-charge circulation	30	63.8
Any staff on duty	2	4.3
specific persons	9	19.1
Any staff with right to clear	6	12.8
Total	**47**	**100.0**

4.6.5 Mitigation of Errors

Participants were asked to give honest proposals on how the human errors could be mitigated. The following were the suggestions listed in order of merit; Regular staff training (37%), System error-control defences (19%), AMLIB symbols and icons to represent real objects, and Passport photos of users to be conspicuous in their files (11%) each and Staff specialization in certain AMLIB modules(10%). Others were, Shut-down and renew of time-credits of the AMLIB user after every 2 to 3 hours (6%), frequent staff reshuffles (5%) and lastly, Employing additional staff (1%). These results imply that the best measure to control errors from frequent occurrence is by conducting regular training to the library staff and the AMLIB system to have an error-control defence mechanism.

4.6.6 System Upgrade

Figure 4.13 shows that indeed there has been AMLIB system upgrade since the time it was acquired. The system upgrade was done by the experts from the AMLIB vendor as reported by the respondents. However, there are no indicators that explain staff improvement on the use of the AMLIB system since the upgrade was done as errors have continued to be witnessed in the processing and circulation of library resources.

There has been system upgrade since acquired

25% No

75% Yes
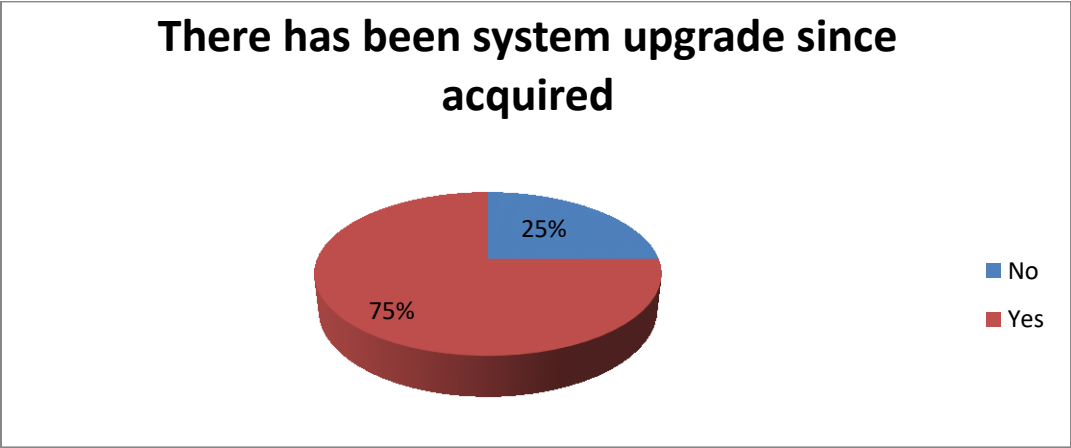
Figure 4.13 System Upgrade

4.6.7 Staff Opinion on AMLIB performance in E.U. Library

A majority (63%) of the respondents were of the opinion that the AMLIB system was user-friendly, easy to use and flexible. Another 18% said that AMLIB was a good system to use if only the staff were well trained, 16% said that the Net OPAC was not reliable due to internet fluctuations, while 10% observed that spell-checks ought to be provided in the AMLIB to assist minimize spelling errors in the library database.

4.6.8 Improving Library Services

Results in Table 4.18 give suggestions from the respondents on how library services could be improved to minimize complaints and delays in services delivery. The following were the measures suggested; Expansion of the library space, employ an additional staff and increase library materials (32%), Increase number of computers and network access for faster service delivery (18%), make few adjustments to address the AMLIB shortcomings (16%), and approximately 10% suggested that a complaint desk be introduced in the library. Additionally, power efficiency was a matter to be addressed according to 5% of the respondents and lastly, a thorough orientation of the library users (1%). However, some respondents (18%) decided not to give their comments.

The handling of the users' complaints, from the interviewees' perspective, is being done by the in-charge Reader Service Division in liaison with the In-charge circulation section alone. Technically what this means is that in the event of their absenteeism resulting from unforeseen reasons, the user complaints are not attended to.

In addition, the Interviewees affirmed that there are no measures put in place for the staff to continue working offline in the technical services division in cases of internet failure or power disruptions. A temporary cancellation file was said to be available at the library circulation return desk that records all returned items when the system is down awaiting their eventual clearance once the system restores. However, the participants confirmed that no one is assigned to ensure clearances of such temporary records from the AMLIB system, once the system recovers. This was found to be the main cause of unjustifiable claims for non-returns and over dues made by the library to its patrons.

Other opinions by the interviewees regarding measures to eliminate/reduce occurrences of errors in the E.U library were as follows: conducting regular in-house training to all library staff, embracing teamwork, self-motivation amongst the staff, recognizing the best performers in the library category during the prize giving day and, installing more facilities and equipment in the library. This now confirms the suggestions given by the respondents from Table 4.18

Table 4.18: Suggestions on Improving Library Services

Suggestion	Frequency	Percent (%)
No suggestion	13	17.6
Few adjustments to address the AMLIB shortcomings	12	16.2
Power efficiency should be addressed	4	5.4
Expand the library space, employ more staff and increase library materials	24	32.4
Increase number of computers and network access for faster service delivery	13	17.6
Complaints desk should be introduced in the library	7	9.5
Thorough orientation to the software users	1	1.4
Total	**108**	**100**

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents a summary of the major research findings, conclusions and recommendations drawn from the findings. The study reports the sources of human errors in the AMLIB software at Egerton university library Njoro, Kenya, while guided by the following specific objectives:

i) To identify the types of human errors associated with the use of the AMLIB software at Egerton University Library.

ii) To establish the sources of human errors associated with the use of the AMLIB software at Egerton University Library.

iii) To determine the skills and knowledge deficiencies of the library staff that limit the effective use of AMLIB software at Egerton University Library.

Primary data and secondary data were used to expose the sources and effects of human errors in the study area. Primary data was collected using structured questionnaires from the library staff and users, and interview schedules held with key informants who head the library's technical division and the reader services division. Secondary data was collected from documented information in the complaint registers.

5.2 Summary of the Findings

The major findings are based on study objectives and data analysis.

5.2.1 Types of Human Errors

The study revealed that the common human errors that occur while using the AMLIB software are the errors of omission, errors of commission and errors of record redundancy. The error of omission is where vital data of users or information resources are missing such that retrieving the resource(s) in the future becomes difficult or problematic especially in categorizing between similar items or subjects. The cause for the omission is attributed to memory lapse and slips in the person creating a record in the AMLIB system. The outcome of this type of error is that items will be difficult to be retrieved and borrowers' data will not be found in library databases such that they

will not be searchable, accounted for or served. Consequently, the error causes a delay in services and sometimes inaccurate reports on library stock and library users will be witnessed.

The errors of commission were also found to be contributing factors to frequent conflicts between library users and library staff because of inaccurate data, mixed-up data lacks critical part of data, or sometimes files were not cleared or updated. In the error of data redundancy in the OPAC, files are duplicated severally, making the OPAC search hits to be bulky and time consuming for researchers to consult.

5.2.2 Sources of Human Errors

The most underlying sources that were found to affect users of the software in making errors were: inadequate training, time pressure, fatigue, long procedures, system interfaces and other environmental factors as those reported in the findings. Many reasons cause humans to make errors. The study findings agree with Norman's, (2013) argument on perceived sources of errors that the main sources of human errors are the nature of tasks and procedures that compel a person to multitask while being subjected to interfering activities.

5.3 Staff Skill Gap and Training

This study found out that staff do not have adequate skills and knowledge to handle most of the AMLIB software modules because of irregular training that is not pre-planned and the pitiable manner in which the training is carried out. However, most staff rely on each other's experiences and share their skills within their working areas. The findings disclose that most trainings of staff are conducted in-house and are limited to software modules that have been paid for by the library. These trainings are inadequately done such that staff are not given ample time for practice as learning progresses. Further, the study revealed that another reason behind the skill gap is caused by restriction to staff to operate modules related only to their respective sections. The restriction is intended to ensure that staff understands fully the AMLIB software activities in their current sections so that they achieve better performances. Though it's well-intended, the restrictions and water-tight control of user rights blocks staff from exposure to other software modules in other sections. As a result, when internal transfers are made, staff makes lot of errors before they become acquainted with the modules in the new sections.

The study also found out that most staff in the library are over trusted to work well with the AMLIB system because of their academic levels. The staff are diploma and degree certificate holders and because of the trust bestowed on them by their seniors, there lacks supervision on their performances in both Technical and Reader services divisions.

5.4 Conclusions

This research identified three types of errors which are: errors of omissions, errors of commissions and data redundancy errors which occur in the library while processing information resources, registration of new library users and in the circulation of library resources. Errors of omission occur where important data is not captured in the system that is significant in the retrieval of records while errors of commission occur where data is mixed up such that subjects are assigned descriptions that are far away from their disciplines. Data redundancy is about unnecessary duplication of records that wasted library users' time during searching of records besides occupying unjustifiable space in the AMLIB system in E.U library.

The sources of these errors were identified to be associated with many factors that cut across the system users and the system itself. Those associated with users include fatigue, negligence, inattention, lack of exposure, inadequate training, and inadequate supervision. Factors associated with the AMLIB system are long procedures in processing information resources, difficult modules, and lack of adequate error-defence mechanisms.

Staff skills and knowledge deficiencies in the operations of the AMLIB software were reported to be occasioned by the following: lack of adequate and regular training, lack of experienced staff, and the limiting internal staff reshuffles that do not support staff to learn much about the system beyond what is relevant to their current sections of work. If these concerns are addressed, AMLIB software would serve the library well as it can handle all aspects of library routine works.

5.5. Recommendations

The following recommendations are made in terms of the objectives of this study while focusing on the use of the AMLIB library management information system.

i) Intensive regular training programmes for staff should be provided by the AMLIB vendor and the system librarian.

ii) Closer supervisions of experienced and inexperienced library staff, interns and student attachees should be improved by the University librarian.

iii) The security of the system is of paramount importance. It can be improved through the following: the AMLIB software be customized by the System librarian to automatically block logged-in staff from issuing, returning or clearing their AMLIB accounts; University Librarian to introduce verifying check-out desks to undertake verification and legality of loans and authenticity of information resources transiting from one section to another in the library; stringent controls on users' rights and privileges should be enhanced to deny staff the right to change usernames and passwords without the consent of the system librarian; staff proceeding on leave or on off-duty should have their AMLIB system rights and privileges suspended by the System Librarian for the period they are away and; the tendency of attachees and interns sharing AMLIB accounts amongst themselves or with other library staff is good for training but should be stopped forthwith by in-charge section heads.

iv) Staff work-stations should be relocated to places free from noise and disruptions by other on-going activities emanating from the library reprographic room.

v) The University librarian should ensure that the AMLIB software and the OPAC manuals are available in all areas of software undertakings to help in overcoming emerging challenges at work. Also, staff working hours should be reduced by creating work-breaks or allowing staff to exchange their work roles after some period of time during the day.

vi) The AMLIB system vendor should introduce more interactive error-defence mechanisms to help users recall actions required to execute a successive operation or before exiting an interface.

5.6 Areas for Further Research

The researcher recommends further research be undertaken in the following areas:

i) Evaluating system performances between Proprietary Software (PS) and Open Source Software (OSS) in academic libraries.

ii) The significance of institutional policy in the acquisition of Integrated Library Management Information Systems (ILMS) for academic libraries.

REFERENCES

Ackoff, R.L. (2014). Towards a system of systems concepts. *Management Science*, 17, (11),661-671. Retrieved March 26, 2016 from https://bit.ly/2WYSzvc

Anderson, R.J. (2008). *Security engineering: a guide to building dependable distributed system*. New York: John Wiley.

Babbie, E. (2004). *The practice of social research*. Belmont, California.

Bakewell, K. & Chandler, G. (1972).*A manual of cataloguing practice*. California: Pergamon Press.

Beebe, M.A. (2017).Impact of ICT revolution on the African academic landscape. New Delhi: Tata McGraw-Hill Publishing Ltd.

Bhattacherjee, A. (2012). Social science research: principles, methods and practices, 2nd ed. Florida, Creative Commons Attribution-Non-Commercial-Share Alike 3.0 Unported License. Retrieved September 18, 2019 from: http://scholarcommons .usf.edu/oa_textbooks.

Chepkwony, J.K. (2012). The development of academic libraries and information services in Kenya. Nairobi: UoN Library. Retrieved January 22, 2020 from: http://hdl.handle. net/11295/24135.

Cheryl, A. [et al.],(2011).Caribbean libraries in international dictionary of library histories. Florida, USA: IFLA. Retrieved January 22, 2020 from; http://conference.ifla.org/ifla77.

Cicnavi, (2010).Typical system errors and how to deal with them. Retrieved from www.utilizewindows.com/.

Creswell, J.W. (2007). *Designing and conducting mixed methods research*. Thousand Oaks, Sage.

Desai, R. (2010). Human error. Mumbai. Retrieved July 4, 2016 from http://drrajivdesaimd.com/ 2010/09/10/human-error/.

Dorion, P. (2008). Data deletion or data destruction. Retrieved February 8, 2018 from http://www.searchdatabackup.techtarget.com/

Egerton University.(2019). *The Egerton university library policy* (rev.ed.). Njoro: Egerton University.

Fong, C. (2012). *The new librarian: from manual to online cataloguing*. Toronto: AALL.

Gerhart, M. (2015).Database abuse. Retrieved January 29, 2018 from http://www.imperva. dababase.abuse/

Haonan, W.[et al].(2013).Generalized linear mixed models for branching probabilities of brain artery system: model assisted statistics and application.

Imo, N.T. & Igbo, U.H. (2011). The challenges of software use in Nigerian university libraries: review of experiences from 1990-2009. Ibadan. Retrieved February 5, 2018 from https://bit.ly/2HDKvtu.

Jain, P. (2016). Challenges of twenty-first century academic libraries in Africa. *African Journal of Library, Archives and Information Science 26(2)*. Retrieved January 8, 2019 from https://www.researchgate.net/publication/317760814

Kamba, M.A. (2011). "Implication of ICT's in Libraries of Higher Education Institutes: A Panacea Catapulting Library Development in Africa" *DESIDOC Journal of Library & Information Technology, 31 (1), 65-71*.

Kombo, D.K. & Tromp, D.L. (2011). *Proposal and thesis writing*. Nairobi: Paulines Publications Africa.Retrieved November 2017 from https://bit.ly/2Eoy046.

Kothari, C. R. (2008). *Research methodology: methods and techniques*. New Delhi: New Age International.

Lindsay, N. (2004). Libraries Come of Age. *Journal of Information World Review*, 201, 16-18. London: Incisive Media. Retrieved November 23, 2017 from www.infotoday.com

Maurer, R. (2015). Top database security threat and how to mitigate. Retrieved September 10, 2015 from https://bit.ly/30DfOgv.

Mott, E. (n.d.). Why is it not feasible for companies to produce an error-free software? Retrieved March 9, 2020from https://smallbusiness.chron.com/

Mugenda, O.M. & Mugenda, A.G. (2003). Research methods: quantitative and qualitative approaches. Nairobi: African Centre for Technology Studies.

Mutula, S.M. (2012). *Library automation in sub-Saharan Africa: case study of the University of Botswana*: West Yorkshire, Emerald Group Publishing Limited. Retrieved October 12, 2017 from https://bit.ly/2M0roiH.

Nassiuma, D.K. (2000). *Survey sampling: theory and methods*. Nairobi: Nairobi University Press.

Norman, D. (2013). *The design of everyday things*, *(rev and expanded ed.)*. New York: Basic Books. Retrieved July, 12 2017 from https://bit.ly/2YIgRu8.

Nyamboga, C., Ongus, R. & Njuguna, A. (2012).*Impact of the AMLIB integrated library management system on information management practices at Egerton University library, Njoro campus, Kenya. Egerton*: Egerton University. Retrieved September, 6, 2016 fromhttps://erepository.mku.ac.ke/handle/123456789/3866.

Ondari-Okemwa, E. (1999). Managing a library automation project: the Moi University experience. *Library Management 20* (4), 228-234. Retrieved July 21, 2016 from; https://bit.ly/2HIZRNd.

Pratheepan, T. (2012).*Integrated library management systems (ILMS) - open source and commercial software: an assessment of the merits and demerits*. Badulla: Uva Wellassa University. Retrieved December 16, 2018 from https://goo.gl/AxNQAr.

Rach, A. (2014). Introduction to circulation and types of circulation systems. Retrieved February 5, 2018 from https://bit.ly/2W0m0vR.

Reason, J. (2012).Human error: models and management. Retrieved January 12, 2018from www.ncbi.nlm.nih.gov/.

Rossman, G. & Rallis, S.F. (2011).*Learning in the field: an introduction to qualitative research*. (4thEd).Thousand Oaks, CA: Sage.

Sani, C. M. (2006).*An investigation and evaluation of three integrated library systems for the human sciences research council information services*. Stellenbosch: University of Stellenbosch. Retrieved August 2, 2017 from https://bit.ly/2MkbPT5.

Smith-Atakan, S. (2006).*Human-computer interaction*. The Burroughs: Middlesex University London.

Thomas, E.J. & Petersen, L.A. (2003).Measuring errors and adverse events in health care. *Journal of General Internal Medicine* 18 (1) 61-67. Retrieved November 8, 2017 from http://www.onlinelibrary.wiley.com.

Ward, P. (2012). *Database management systems*. Sydney: Cengage Learning EMEA. Retrieved April 4, 2018 from https://amzn.to/2WjirF0.

Wu, S. (2013). A Review on coarse warranty data and analysis; *Reliability Engineering and Systems*, 114. 1-11.Science Direct, Elsevier. Retrieved December 9, 2017 from: https://onlinelibrary.wiley.com/doi/full/10.1002/qre.1282.

APPENDICES

APPENDIX A: Questionnaire for Library Staff

Introduction

I am an information science student in the Faculty of Arts and Social Sciences (FASS) pursuing master's degree programme (MISC) of Egerton University at Nakuru Town Campus College. In partial fulfillment of the requirement of the programme, I am undertaking research whose title is **"Assessing Human Errors and Staff Skills in the Use of AMLIB Software at Egerton University Main Library".**

I am requesting that you kindly fill this questionnaire by responding to the simple questions below. Put a tick [√] on your answers and fill in the blank spaces provided. Your response to the questionnaire will be treated with great confidentiality. You need not to identify yourself. You can contact me through phone number 0722922546 for clarification or for any enquiry.

The questionnaire is divided into 3 parts A, B&C. Kindly feel free to respond to all parts. Thank you in advance for your response.

SECTION A

1.   For how long have you worked in this library?

(i)   One year   [ ]

(ii)   Two years   [ ]

(iii)   Three years and above   [ ]

How many hours per day are you supposed to put upworking with the AMLIB software?

_____

2.   What types of errors commonly occur while using the AMLIB software? (Please tick as applicable)

Errors of Omission(You forget to capture part or whole data)   [ ]

Errors of Commission(Data is wrongly entered or posted to different account)   [ ]

3.   How often do you make errors as you process information materials or while issuing out books or at the point of receiving them back from borrowers?

1)   Never   [ ]

2)   Sometimes   [ ]

3)   Always   [ ]

4)   Rarely   [ ]

5)   Often   [ ]

4.   Which category of staff enters data into theAMLIB system? Please mark as appropriate.

a)   Senior staff   [ ]

b)   Middle class staff   [ ]

c)   Junior/ Clerical staff   [ ]

d)   Any other _____

5.   Are staff restricted to access some windows in AMLIB system? YES[   ]
NO[ ] Sometimes [ ]

6.   Use the scale 1 to 5 below, *where SA=Strongly Agree, A=Agree, NS=Not Sure, D=Disagree, SD=Strongly Disagree*

AMLIB users are required to renew theirusers' rights for use of AMLIBsoftware regularly

SA[ ] A[ ]   NS[ ]   D [ ]   SD [ ]

7.   Use the scale 1 to 5 below, *where SA=Strongly Agree, A=Agree, NS=Not Sure, D=Disagree, SD=Strongly Disagree*

AMLIB users are able to change their Usernames and Password at will without necessarily consulting the system librarian

SA [ ]   A[ ]   NS[ ]   D [ ]   SD [ ]

8. Before proceeding on leave or off duty, are you required to surrender your AMLIB access rights for inactivation to the System Librarian?

YES [ ] NO [ ]

9. Do you at times forget to log-off your AMLIB account before leaving circulation desk?

YES [ ] NO [ ] Sometimes [ ]

SECTION B

1. Are there some AMLIB modules that are hard to use/operate? YES [ ] NO [ ]

2. From the scale 1 to 5 below what is your comment on staff restriction in accessing some AMLIB windows?

a) Unacceptable [ ]

b) Slightly unacceptable [ ]

c) Slightly acceptable [ ]

d) Acceptable [ ]

3. Perfectly acceptable [ ]

4. From the scale below 1 to 5, rate with a tick (√) the reasons you think contribute to occurrence of human errors in use of the AMLIBsoftware.*1-Strongly Agree, 2-Agree, 3-Neither Agree nor Disagree, 4-Disagree and 5-Strongly Disagree.*

	1	2	3	4	5
Staff fatigue					
Negligence					
Long procedures					
Lack of proper training					
System failure					
Staff Forgetfulness					
Lack of proper supervision					
Poor User-AMLIB interface					
Intimidation by long borrowers' queue					

5.   What is the level of interpreting meanings of AMLIB symbols and icons while using the software?

a)   Very difficult[ ]

b)   Difficult   [ ]

c)   Neutral   [ ]

d)   Easy   [ ]

e)   Very Easy   [ ]

6.   Students from different training institutions are seconded to conduct their industrial attachment in your library. Are they given the same AMLIB access rights just like most library staff?

YES   [ ]   NO   [ ]   Do Not Know [ ]

7.   Do such attachés share same username and password to access AMLIB software?

YES   [ ]   NO   [ ]   Rarely [ ]

If No, Are they allowed to choose their usernames and passwords without restrictions?

Yes   [ ]   No   [ ]

8.   Are the attaché or the interns' passwords known to other staff working in the library?

YES   [ ]   NO   [ ]

9.   Do you get supervised at every stage of your working with the AMLIB software?

YES [ ]   NO [ ]   Rarely [ ]

10.   Have you been engaged in data cleaning in your library? YES   [ ]   NO[ ]
If NO, who does data cleaning? _____.

11.   Does the AMLIB allow staff on duty at the circulation desk to issue or clear books from his/her account?

YES   [ ]   NO   [ ]

12.   Who determines waivers on overdue fines for records that are erroneously charged as over dues?

a)   In-charge circulation [ ]   b). Any staff on duty   [ ]

c) Specific persons   [ ]   d) Any staff with right to clear   [ ]

13. Is there a default code used to waive erroneous overdue charges? YES [ ] NO[ ].

If yes, is the code known to other staff other than those authorized to waive? YES[ ] NO[].

14.   Why do you think erroneous charges occur?*(Please tick as applies)*

a)   Staff entering wrong data or mixes-up data for different documents [ ]

b)   Status of loan of a book wrongly entered in the system   [ ]

c)   Status of library user records wrongly entered in the system [ ]

d)   System failure and delays in clearing a process   [ ]

e)   Violation of system procedures in data   [ ]

f)   Unforeseen reasons leading to closure of library   [ ]

g)   Staff experiences fatigue or neglect to enter part of data or forgetting to clear loans

       [ ]

h)   Others please specify.

_____

15.   There are cases when the system may be down due to system failure or power outages/surges such that clearance of returned documents is delayed and hence attracts overdue fines. Are such documents waived from fine payments? YES [ ]   NO [ ]

In such situations what document do users get as evidence of books returned but yet to be cleared from the system?_____

_____

16.   In cases of lost borrowed items, does AMLIB facilitate stoppage of fines accruing from the date reported?

YES   [ ]   NO   [ ]

SECTION C

1.   In your own opinion, do you think staff have adequate skillsto work with the AMLIB software?   YES   [ ]   NO   [ ]

2.   Are you able to interact with AMLIB without seeking for assistance from colleagues?   YES_____   Somehow_____   NO_____

3.   Is there a default access code for staff who might have forgotten their usernames or passwords in order to access the AMLIB software?

YES   [ ]   NO   [ ]   Not Aware   [ ]

4.   Are there periodic AMLIB training sessions organized for library staff?

YES   [ ]   NO   [ ]

If yes, how often are the trainings held?

(a) Monthly   [ ]   (b) Quarterly [ ]   (c) Yearly [ ] (d) Rarely   [ ]

5.   Do you think you have the right qualifications and skills to work with AMLIB system?

YES   [ ]   NO   [ ]   Not sure   [ ].

6.   Who conducts AMLIB trainings? (*Tick as applies*)

*   Experts from AMLIB vendor [ ]
*   Senior librarians   [ ]
*   System librarians   [ ]
*   Fellow colleagues   [ ]
*   In-house drills   [ ]
*   Any other, _____

7.   Are there AMLIB manuals in place to help users in cases of trouble shootings?

YES   [ ]   NO   [ ]

8.   Give your opinion on the following statement. That "the AMLIB software is user-friendly in terms of guiding the user in step by step instructions throughout the interface".

1)   Strongly disagree   [ ]
2)   Disagree   [ ]
3)   Neither agree or disagree   [ ]
4)   Agree   [ ]
5)   Strongly agree   [ ]

9. To control errors from frequent occurrence, please indicate which of the following mitigating factors would be ideal?

(i) Regular staff training   [ ]

(ii) Frequent staff reshuffles   [ ]

(iii) Additional staff   [ ]

(iv) System error-control defences   [ ]

(v) Shut down and renew of time-credits of user after every two to three hours [ ]

(vi) Staff specialization on specific modules   [ ]

(vii) Symbols and icons to represent real life objects   [ ]

(viii) Passport photos of users to be conspicuous in their files when logged on   [ ]

Others_____

10. Has there been system upgrading since AMLIB was acquired?

YES[ ]   NO[ ] .   If Yes, who does it and how often --

--.

11. Please give your opinion on the performance of AMLIB software in your library.

_____

_____

_____.

APPENDIX B: Questionnaire for Library Users

Introduction

I am an Information Science student in the Faculty of Arts and Social Sciences (FASS) pursuing Masters Degree in Information Science Programme (MISC) of Egerton University at Nakuru Town Campus College. In partial fulfillment of the requirement of the programme, I am undertaking research whose title is **"Assessing Human Errors and Staff Skills in the Use of AMLIB Software at Egerton University Main Library".**

I am requesting that you kindly fill this questionnaire by responding to the simple questions below. Mark with a tick [√] on your answers and also fill in the blank spaces provided. Your response to the questionnaire will be treated with great confidentiality. You need not to identify yourself. You can contact me through phone number 0722922546 for clarification or for any enquiry.

The questionnaire is divided into2parts, A&B. Please feel free to respond to both parts.

Thank you in advance for your response.

SECTION A

1.   Please choose your category of library user below

      a)   Undergraduate student   [ ]

      b)   Postgraduate student   [ ]

      c)   Academic staff   [ ]

      d)   Non-academic staff   [ ]

      e)   Others _____

2.   Do you borrow information resources from this library?

      YES   [ ]   NO   [ ]

3.   Are you required to identify yourself with a University/Library ID or national IDwhen borrowing and returning of library information resources?

      YES   [ ]   NO   [ ]

4.   In absence of such an identification document, do library staff continue to serve you based on mutual understanding?

        YES   [ ]   NO   [ ]   Sometimes   [ ]

5.   Have you at one time, paid overdue fines for library documents returned late?

        YES   [ ]   NO   [ ]

6.   Have you ever received a reminder memo asking that you return library document(s) you never borrowed?

        YES   [ ]   NO   [ ]

7.   Does Library Circulation Services section provide an alternative way of issuing and receiving library documents from borrowers in cases of system failure or power outages?

        YES   [ ]   NO   [ ]

SECTION B

1.   Have you at any one time been denied loan of a library resource due to inaccessibility of your file?   YES   [ ]   NO [ ]

2.   Have you encountered problems related to wrong entry of data that differs from the actual document held?   YES   [ ]   NO   [ ].

3.   Do you sometimes get delayed in getting served due to long queues at the circulation desk?

        YES   [ ]   NO   [ ]

4.   Are you able to access and verify data in your account any time you want to? YES[ ]

        NO   [ ]   Sometimes   [ ].

5.   What do you think is the cause of long queues? Please list as many causes as may be applicable

_____

_____

_____

_____.

6.   Are you satisfied with the library automated user services?   YES

        [ ]   NO   [ ]

7.   Please suggest how library services could be improved to minimize complaints and delays in service delivery.

APPENDIX C: Interview Questions for Library Staff

"Assessing Human Errors and Staff Skills in the Use of the AMLIB Software in Egerton University Main Library".
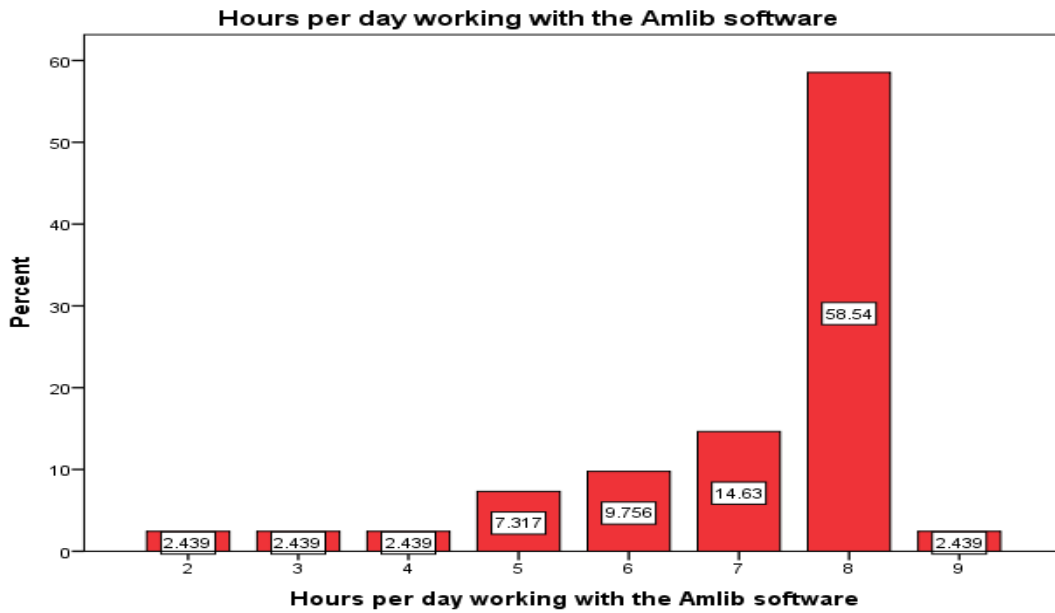
1. How long have you used AMLIB software at the EU main library?

2. Did you undertake special training on AMLIB application? If yes, how long did the training take?

3. Are you able to work with all the AMLIB modules?

4. Are the windows complicated to understand and use?

5. What kind of problems do you experience while working with the AMLIB at your section?

6. Do you experience fatigue in using the AMLIB software?

7. Are the AMLIB software procedures easier to follow and use?

8. Do you have rights to change your password at will?

9. Can an AMLIB user issue or cancel a loan from his/her account?

10. At any one time do you share your username with other staff?

11. When proceeding on leave or off duty, are you required to surrender your log-in rights to your supervisor for deactivation?

12. Which errors commonly occur while issuing or returning books at the circulation desk?

13. Why do you think these errors occur?

14. Who verifies if the data entered into the system is correct?

15. Are you allowed to waive overdue fines to library borrowers?

16. Who handles user's complaints especially on loans?

17. In your own opinion, what do you think can be done to eliminate occurrences of errors?

18. In cases of internet failure or disruption, are there mechanisms in place to continue working offline?
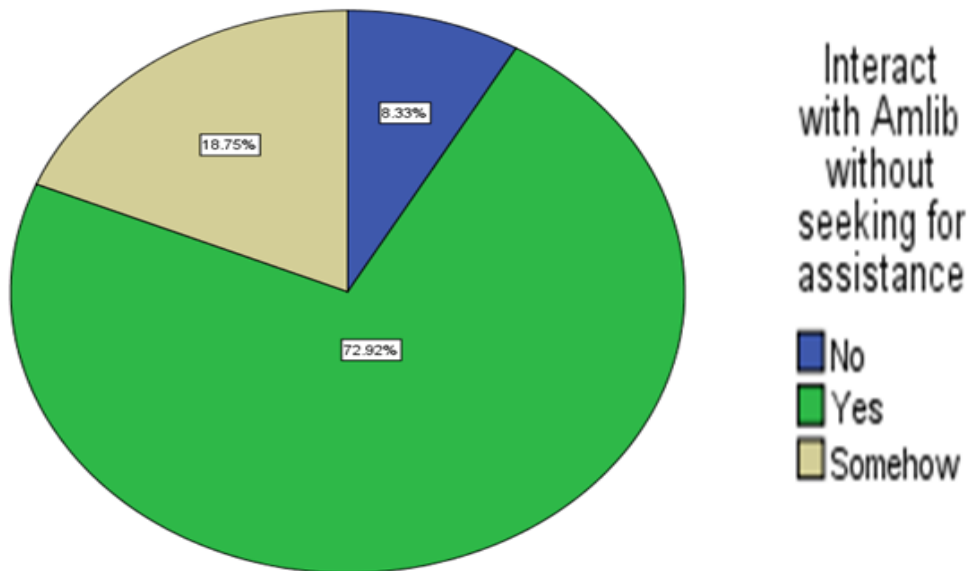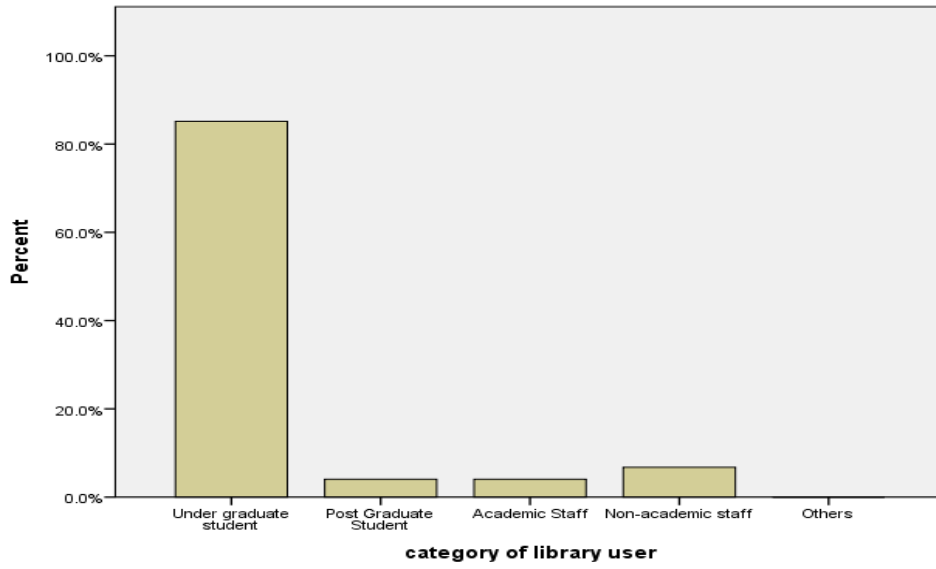
APPENDIX D: Interview Questions for Library Users

"Assessing Human Errors and Staff Skills in the Use of the AMLIB Software in Egerton University Main Library".

1. Are you able to search for information material by use of the OPAC?

2. Is the OPAC able to identify what you need free of redundancy?

3. Are the bibliographic details of the document you search helpful and satisfactory to facilitate rapid retrieval?

4. Do you borrow books and other information resources from EU main Library?

5. If yes, how long is your loan entitlement?

6. At times, do you return borrowed books late after their due date?

7. Are there reminder memos sent to you via email services?

8. Are there situations when you get wrongly penalized/fined for assumed late returns?

9. Have you been waived some fines based on mutual understanding?

10. Have you experienced a situation where library staff are not able to retrieve your library account?

11. At any one time, has the library asked you to return a library item you never borrowed?

12. Do you think it is easy to corrupt library staff so as to compromise the system in your favour?

13. How long does it take staff at the circulation services desk to issue to you an information resource?

14. Are library staff competent in services delivery especially in the use of the AMLIB?

15. Kindly give your honest observation of the system the library uses to process, issue, return and reserve information collection for library users.

APPENDIX E: Key Analysis Output

Percent

category of library user

Interact
with Amlib
without
seeking for
assistance

■ No
■ Yes
□ Somehow

APPENDIX F: Research Permit

THIS IS TO CERTIFY THAT:
MR. PHILIP KAMAU MUCHIRI
of EGERTON UNIVERSITY, 0-20115
EGERTON, has been permitted to
conduct research in *Nakuru County*

on the topic: *SOURCES OF HUMAN
ERRORS IN THE AMLIB SOFTWARE AT
EGERTON UNIVERSITY MAIN LIBRARY
NJORO, KENYA*

for the period ending:
11th June,2019

Permit No : NACOSTI/P/18/29183/23227
Date Of Issue : 13th June,2018
Fee Recieved :Ksh 1000

....
**Applicant's
Signature**

....
**Director General
National Commission for Science,
Technology & Innovation**

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APPENDIX E: Abstract of the Published Paper

The Skills and Knowledge Gap that Inhibit Effective Use of the Amlib Library Management Software at Egerton University Library, Njoro – Kenya

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Abstract Members of staffs are the main assets of an organization who propel its growth. Success in the use of Information Communication Technology (ICT) in an organization is dependent on staff capacity to effectively use the new technology. Organizations sometimes procure IT equipments, with little regard to staff capability to use them. Library staff are disadvantaged due to insufficient training that makes them unfamiliar with the new interfaces, and hence prone to make errors while using the software. This research revealed that lack of skills and knowledge on the use of the Amlib software contributes to human errors. Recommendations are provided that mitigates on the systems' user skills and knowledge deficiency.

Keywords Human errors, Library and Information Science, The Amlib software

1. Introduction

Automation in libraries has increased efficiency in processing, storage, retrieval, and high speed in services delivery as well as in the management and coordination of library functions. The amount of time spent in processing and delivering information resources to users in libraries is dramatically reduced and staff are relieved monotonous and repetitive work when they use library automated software. The use of Information Communication Technology (ICT) has seen great strides in reducing human errors that were rampant in the use of human manual systems. Norman (2012) acknowledges the impact of ICT in libraries by affirming that the purpose of automation is to save people from the dull, dreary routine tasks, reduce fatigue, allow productive use of time as well as reduce errors, besides increasing speed and efficiency in work and in information searching output. Kimaro (2017) concurs with Norman by stating that ICT is introduced in an organization to help manage resources, increase efficiency, increase work productivity and reduce workload.

Before the advent of ICTs and by extension the Integrated Library Systems (ILS), Rach (2008) says that many academic libraries were using in-house manual systems to process, store, retrieve and circulate library collection to library users. She attributes the practice to the high cost of investing in computers, software and the infrastructure that was not justifiable to serve the then existing small number of users served by an information centre and hence manual systems continued to be ideal systems in many information centres.

The manual systems caused many variations and inconsistencies in material processing by staff such that materials that were similar in content were dispersed in their shelf relative locations or not found at all because different staff could interpret the Cataloguing and Classification codes differently. The errors made it difficult for users to access and retrieve information resources they required at the time of need and a lot of time was wasted in searching for materials on the shelves and hence information seekers were compelled by the then circumstances to physically master shelve locations of different resources rather than search using the retrieval tools available. This practise by users disoriented them especially when resources were moved to other locations as part of library house-keeping practices. Sindhav and Patel, (2014) observed that the manual systems lend to duplication of work and a lot of manpower to complete a task that would otherwise be handled by a single computer at great speed and accuracy. These were the practices at Egerton University library before it was automated. In order to overcome these challenges, the Egerton University library acquired an Integrated Library System known as the AMLIB that could standardize the processing, cataloguing, and circulation of library