

ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATE STUDIES
SCHOOL OF INFORMATION STUDIES FOR AFRICA

**AN ONLINE PUBLIC ACCESS CATALOGUE FOR THE EGERTON
UNIVERSITY LIBRARY SYSTEM : A PROPOSAL AND STRATEGY FOR
IMPLEMENTATION**

A THESIS
**SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE
DEGREE OF MASTER OF SCIENCE IN INFORMATION SCIENCE**

BY

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Name and Signature of Members of the Examining Board

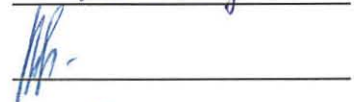
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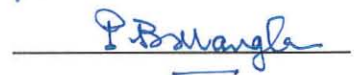
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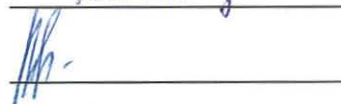
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DEDICATED TO
My mother Eremina and my son George

ABSTRACT

The need to introduce computers in Egerton University Libraries have been emphasized in this document. The document particularly discusses the need to computerise the catalogue system which is the main access to the libraries' holdings. Application of IT in Kenya has been briefly discussed with particular reference to specific areas in libraries that have benefited from computerisation.

Analysis of Egerton University in terms of its structure and functions carried out in the various library sections have been discussed with particular reference to the catalogue and the cataloguing process. The results of questionnaire and interview surveys of the library users, library personnel as well as the computer vendors in Kenya have also been presented and analyzed. Findings from the literature review on various library management software packages and in particular, the OPAC features they offer have been discussed.

User requirements and desired features of the proposed system which were defined following the analysis of the survey findings as well as literature review have also been documented.

EULOPAC, a prototype system has been designed to demonstrate how the proposed system can work. Prototype databases for monographs, serials, reports and cartographic materials were developed following MARC format, in CDS/ISIS platform. Program source codes had to be developed using ISIS Pascal to develop an OPAC

interface. These prototype databases as well as the developed interface have been discussed. A strategy for implementation was developed and this has been presented in chapter eight.

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LIST OF ABBREVIATED TERMS

AACR2	Anglo American Cataloguing Rules 2
ACCE	African Council on Communication Education
AMERL	American Cultural Centre
CIP	Cataloguing In Publication
CWSGA	Centre for Women Studies and Gender Analysis
DDC	Dewey Decimal Classification
ELCI	Environmental Liaison Centre International
EULOPAC	Egerton University Online Public Access Catalogue
FASS	Faculty of Arts and Social Sciences
FAO	Food and Agriculture Organisation
ICIPE	International Centre of Insect Physiology and Ecology
ICRAF	International Centre for Research and Agroforestry
IDRC	International Development Research Centre
ILCA	International Livestock Centre for Africa
ILRI	International Livestock Research Institute
ISSN	International Standard Serials Number
ISBN	International Standard Book Number

IT	Information Technology
KARI	Kenya Agricultural Research Institute
KLA	Kenya Library Association
KNLS	Kenya National Library Service
KTTC	Kenya Teachers Training College
KP&TC	Kenya Posts and Telecommunications Corporation
LAN	Local Area Network
LC	Library of Congress
MARC	Machine Readable Cataloguing
NCST	National Council for Science and Technology
OPAC	Online Public Access Catalogue
PADIS	Pan African Development Information Systems
UNEP	United Nations Environment Program
UNESCO	United Nations Education Scientific and Cultural Organisation
USAID	United States of America International Aid
WAN	Wide Area Network

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND INFORMATION

Today, the importance of information in national development cannot be ignored. Information is a resource that can be used to utilize the other traditional resources like land, labour and capital. Therefore, the capacity to generate, process, store, disseminate and utilize productive information will determine the social and economic development of a country.

Many developed countries are said to have long moved from the industrial to post-industrial age or the information age. Unfortunately the same cannot be said about the African countries, Kenya being one of them. Most of these countries still lag behind in many aspects.

Africa is dependent upon developed countries for finance, technology, food, weapons, human resources and markets for her raw materials, and even for information. Over 90% of the book stocks and periodicals of libraries and other information centres in Sub-Saharan Africa are imported from Western countries (Zulu 1994). In addition, "Africa does not even have data about herself. About 90% of data on Africa resides on databases in the West" (Zwangobani, E. in Zulu 1994, 80). To utilize this vast store of information existing in developed countries as well as to share its own data within the

continent, Africa has to keep abreast with the technological changes taking place in the developed countries.

African countries, Kenya inclusive, have also realised the importance of information. Policy makers in many African countries have become aware of the benefits of information in sustaining social and economic development and hence the welfare of their people. In this realisation, information centres and libraries play a major role in the national development of a country by collecting, organising and disseminating information to various users who need this information in their daily social and economic activities. This can not be effectively achieved without the assistance of IT.

IT is needed in libraries and information centres today more than ever before. This is due to various reasons including, the large amount of information being published every day, which is difficult to handle without computerization. The amount of information available in machine readable form is also increasing, with some being available only in a machine readable form (Ravichandra 1990). The 1991 edition of machine readable databases directory, lists 4018 databases publicly available online and 715 available on CD-ROM. The 1992 edition of the same directory lists 4618 databases available online and 1019 available on CD-ROM (EL-Hadidy 1994). This shows that the amount of information available in machine readable form is increasing. To make use of such information, libraries have to be well equipped with the necessary modern IT. In addition, machine readable bibliographic records can be used by many users for various purposes any number of times. Since the number of users and consequently the need for information is on the increase, it is necessary to make sure that this information can be accessed by many users at the time it is required.

Library automation started way back in the 1880s. Hollerith invented the punch card in 1880, which was used by the University of Texas in 1936 for circulation control. General purpose computers for performing traditional library activities became available in 1960, and by late 1960s, online, real-time interactive computer systems were introduced in the library and information field. In the early 1970s, design of online systems and conversion of batch systems to online mode were in operation in many libraries. By 1980s, there was intensive use of online systems and use of mini/micro computers, especially the microprocessors (Ravichandra 1990).

The use of computer-based systems in Libraries and information units is now on the increase all over the world. Africa too realises the need for IT application in the information centres. A survey carried out by PADIS in 1990 revealed that most Libraries and information systems in Africa are using microcomputers for:

- bibliographic and/or library database management (58%);
- word processing (54.1%);
- financial/management application (16.4%),
- numerical and statistical application (16.4%), and;
- others (8.2%) for other applications (E/ECA/PSD.6/TP4 1994).

IT may also be applied to assist in performing all the major functions of the library including, housekeeping operations like cataloguing, circulation control, acquisition control and serials control.

One of the major tasks of a library can be said to be bibliographic control which include the systematic and comprehensive collection, organisation and dissemination of

information about documents. The main purpose is to enable all potential users of the documents to identify, locate, and gain access to every document useful for their particular purpose. In this case, the library's first task is to assemble a collection of books and other materials well suited to the needs of its users. However, to have a large collection in itself is not enough. The library must be able to provide access to the collection. Therefore, the next task for the library is to prepare a list of all the documents forming its collection and make this list available to its users for easy access to the collection. This list is very important and, has to be organised in such a way that it can easily lead the users to the documents, providing timely access and utilisation of the materials.

The list of library materials can be referred to as a library catalogue. The catalogue is one of the most important tools in the library because it serves as an access key to the library collection, without which the collection of the library cannot be accessed. Charles Ammi Cutter (1876), defined a library's catalogue as an efficient instrument which enables a person to find a book of which either the author, the title or the subject is known; show what a library has by a given author, subject or a given kind of literature; and assist in the choice of a book as to its edition or its character (Cutter, in Tedd 1984).

On the other hand, the catalogue forms the basis on which other functions like circulation will rely. Where a library has automated its housekeeping operations like acquisitions, circulation control, and cataloguing, the catalogue becomes even more useful, since it becomes possible to link the catalogue to the circulation section so that it is possible to determine whether a book is on loan or is available on the shelf. The

catalogue database can also be consulted before ordering any document to verify whether it is already in the collection or not.

Today, the emphasis in libraries is shifting from collections to access. "Providing access to information has become the principal goal and activity" (Amekuede 1995). There are wide ranges of applications for document analysis and library management today that make information storage and retrieval more efficient. The traditional card catalogue is even giving way to computerised systems, making possible retrieval of information from local files and searching external online information sources for references to the general literature (Tedd 1984).

The automated catalogue provides public users real time access or interaction with the database, hence the name online. Such online public access catalogues may be searched from a terminal within the originating library, at a terminal elsewhere in the organisation or remotely via a national or international telecommunication network (Hartley et al. 1990). In recent years several libraries have introduced Online Public Access Catalogues (OPACs).

Today, the social and economic development of any country depends not on muscle power but on brain power. The University is one institution that enhances this through the learning process. Hence, the University is an indispensable source of knowledge. In assuming this role, the university library is the principal information resource and service centre for the university.

The basic raw material universities take in, is people, students in particular. The value added is personal development, mainly intellectual, but also physical, social and spiritual. In the process of adding value, information is the most important catalytic factor. Through the teaching process information is traded between teachers and the students, and personal enrichment accrues not just to students but to staff too (Naylor 1993).

To enhance this process, there has to be easy and timely access to the relevant information. To do this unassisted by modern technology is difficult. Therefore the greatest challenge the university libraries face is to integrate IT with the university teaching, research and public service functions (Langenberg 1994).

Egerton University library currently maintains a manual card catalogue for its collection. This was initially adequate for the users, but not any more. Due to the upgrading of the University from an agricultural college to a University in 1986, the number of users as well as the Library collection has increased. In 1960 the library had about 3500 volumes of books and 500 bound periodicals. Currently the main campus library situated at Njoro holds approximately 93,000 materials (books and bound periodicals) while the branch Libraries at Laikipia and Kisii campus hold approximately 15,078 and 9,100 respectively (see Figure 3.2 in Chapter 3). The student population has also increased from 110 in 1949 to approximately 6072 in 1995, while the staff population is about 3,274. This increase in population and consequently the increased demand on the information services, has increased pressure on the library facilities and services including the catalogue.

Egerton university library must therefore restructure and improve its services to better meet the needs of the users. This can be well achieved through introduction of a computer-based system. Having realised this, the university plans to computerise the library operations in the near future. According to the Egerton University Library 1992 annual report, one of the major reasons for planning to computerise the library is to enhance record keeping and information storage and retrieval (Egerton University Library Annual Report 1992).

In line with this plan, a research project has been carried out with the aim of proposing an OPAC system which would enhance users' timely access to information. This proposed computerisation of the catalogue system is a first step towards the computerization of library operations.

1.2 JUSTIFICATIONS

As mentioned earlier, Egerton University library currently has a manual card catalogue. This card catalogue is not up to date. Updating the catalogue takes a lot of time since removing the catalogue cards of the books lost or adding cards of newly acquired books requires a lot of filing. Therefore, users cannot make full utilization of the existing collection and sometimes have to depend on accidental discovery of the materials.

The preparation of catalogue cards manually is a long and time consuming process, as some materials require several added entries. A single book may require

preparation of a total of six or seven cards to cater for the added entries. This increases the number of cards, making filing of the cards and updating of the catalogue more tiresome and time consuming. With online cataloguing, staff will not have to spend so much time and effort, to prepare and file cards.

Presently, the departmental and the branch libraries are not able to easily access the Egerton University Main library's catalogue due to the long distance between them. Laikipia and Kisii campus libraries are approximately 85 and 210 kilometres respectively away from the Main university library. Introduction of computers and subsequent networking of the libraries will therefore facilitate easy access to the libraries' catalogues and hence to the collection, by the Main library, departmental and branch libraries. This will also facilitate resource sharing among the libraries.

Using a manual card catalogue wastes the users' time as this catalogue can only be searched by a few people at a time. This is against the objectives of the library as stated clearly by Ranganathan's five laws of library science, especially the fourth law which advocates for saving the time of the users. He further argued that while libraries have obligations to maximise the users' satisfaction and to minimise time loss to the user, the library management has an objective to save the time of librarians as well. Introduction of an OPAC will facilitate easy access to the database and will reduce the amount of time spent by the users to search the database. The use of a computer-based database will make it easier to display several records on the screen on a given subject in a single search, therefore saving time and effort of the users.

The cost of acquiring manual catalogue cards has also gone up and with the current increasing collection of the library, the cost is expected to be even higher. A computer-based database will be helpful as it will reduce the cost of acquiring manual catalogue cards.

The manual system leads to poor record maintenance. Hence, sometimes there is duplication of work like ordering for materials already existing in the library, as well as preparing catalogues cards twice. This is due to the much effort and time required to consult the card catalogue before any of these activities is carried out. An OPAC and computer-based database will solve this problem since the database can easily be accessed online hence reduce duplication of efforts.

Thus, introduction of an OPAC for Egerton University Library would help:

- Reduce the time and efforts in the preparation and filing of catalogue entries;
- Facilitate end-user searching of the catalogue;
- Reduce the duplication of efforts;
- Enhance better record management;
- Facilitate remote access to the library's holdings; and
- Facilitate resource sharing.

1.3 OBJECTIVES

1.3.1 General Objective

The general objective of this project is to investigate the effectiveness of the current manual card catalogue system of Egerton University Library System. This is aimed at identifying the problem areas, with a view to proposing an Online Public Access Catalogue (OPAC) system for Egerton University Library System. This system is meant to improve the information services rendered by the library system, and in particular, timely access to relevant information sources. Prototype databases and a prototype OPAC module will be developed to show how the proposed system should be.

1.3.2 Specific Objectives

In order to achieve the general objective stated above, this project will aim to achieve the following specific objectives:

1. To investigate the various problems faced by the library staff and the library users as far as accessing the library collection through the existing card catalogue is concerned and identify the users' requirements.
2. To investigate the type of documents held in the library and hence the records in the present card catalogue holds in order to suggest the different types and

number of databases to be created, to facilitate easy access to the library's collection.

3. To look into the online facilities available in the OPAC modules provided by some library management systems in order to propose the most appropriate alternative to cater for the needs of Egerton University Library System users.
4. To propose the specific requirements for the proposed OPAC, based on the users' requirements and the available standards.
5. To design prototype databases structures including the input and output formats that the proposed OPAC may use.
6. To develop a prototype OPAC module using the available facilities at SISA in order to show how the system would function if the proposed module of OPAC is implemented in the Egerton University library system.

1.4 SCOPE AND LIMITATIONS OF THE STUDY

This study was based at Egerton University situated in Njoro in the Rift Valley Province of Kenya. The scope of the study was limited to the catalogue system of Egerton University Library System; the Main University library, the University's branch and the departmental libraries.

In this study, creation of the databases and development of the prototype OPAC module was limited to the CDS/ISIS software package available at SISA. This does not mean that it is the most appropriate software, and any other better software could be adopted to implement the proposed OPAC system. However, all the other recommendations made can be implemented as they are.

1.5 SIGNIFICANCE OF THE RESEARCH RESULTS

The results of this study may be used by the Library Staff and the University management to initiate development of an effective catalogue system capable of meeting the users' needs.

The general users or public of the University Library will benefit from the results since if the proposed system is implemented, they will be able to access the database easily spending minimum time possible to locate the relevant documents for their needs. This will enhance their research activities as they will be able to get timely access to relevant information sources.

The proposed system, when implemented, will form part of an integrated library system, since the University Library management plans to automate all the library operations in the near future. For instance, the databases created can be consulted to clarify various issues for the acquisition and circulation control. This will also reduce duplication of efforts.

The staff will also benefit from the computer based databases as the amount of time used to file the catalogue cards will be reduced. They will therefore have more time to concentrate on other activities which may enhance user utilisation of the information materials.

Online cataloguing will enable cataloguers to create bibliographic records for items as soon as they are acquired and be able to store them online, and thus the possibilities of having back logs would be reduced. This will enhance timely utilisation of the information materials by the users.

The branch libraries will also benefit when the proposed OPAC is implemented by having easy access to the main database without incurring any travel expenses since they will access the database online especially if a wide area network (WAN) is installed.

1.6 ORGANISATION OF THE THESIS

The thesis is comprised of nine chapters. The first chapter provides an introduction to the thesis. The general objective, the specific objectives as well as the methodology used to collect and analyze the collected data are given in this chapter.

The second chapter gives some background information on the thesis. It briefly discusses IT application in Africa with particular reference to Kenya. Various libraries have been discussed mentioning the areas that have been computerised.

The third chapter deals with the description of the Egerton University Library System. Its branch and departmental libraries, the various sections and their functions are discussed here giving more emphasis on the catalogue and the process of cataloguing.

The fourth chapter deals with the major components of an OPAC system, and the desirable online features. OPAC Modules available in some Library Management Systems are discussed with specific reference to the various online catalogue features they provide.

The research findings on the use of the manual catalogue system, and the problems encountered by the users as well as the library personnel are presented and analyzed in the fifth chapter. The tables of computed percentages as well as their interpretation are presented. The findings on the computer services offered by computer vendors are also presented in this chapter. Chapter Six deals with the user requirements and consequently the desired features of the proposed OPAC system.

The designed prototype system EULOPAC is discussed in Chapter 7. A brief discussion of the prototype databases : the FDT, FST and data entry worksheets as well as the prototype OPAC program module have been presented.

The eighth chapter deals with the proposed strategy and plan for implementation of the proposed system. The hardware requirement and software considerations, as well as the phases of implementation are discussed in this chapter.

In Chapter Nine, the last chapter of the thesis, the conclusion and the recommendations based on the research have been presented.

Finally, there is the list of Bibliographic materials consulted in order to come up with this thesis. Last but not least, the appendices giving the sample questionnaires that were used to collect data, the list of the people who provided information and the database structure are also given.

1.7 METHODOLOGY

1.7.1 User Population

The library system under consideration consist of: the Main Library situated at Njoro; two branch libraries, Laikipia Library at Nyahururu and Kisii at Kisii Town; and three departmental libraries within the Main campus, namely FASS, Utafiti and CWSGA libraries. These libraries are located far apart. For instance, Laikipia and Kisii Libraries are approximately 85 and 210 kilometres away from the Main Library.

The library users comprise of students, teaching staff, and non-teaching staff. The number of the registered library users is about 10,000. However, at the time of research, the students who were in the university were about 5236: 186 in Kisii, 406 in Laikipia and 4644 in the Main Campus. The total number of staff members (both academic and non-academic) is about 3,274. However, it was not possible to estimate the number of staff at campus at that time as the records of staff on leave and those on duty were not available.

Due to the large number and wide distribution of users, limited time as well as funds, it was not possible to survey the whole population. Purposive sampling method was used to select the survey samples. Users were divided into two major groups: the staff, both academic and non academic users, and student users. To ensure that opinions were obtained from users of all the libraries, samples were taken from the main library as well as the branch libraries. The surveyed samples have been discussed under the respective methods.

1.7.2 Survey Methods

For the purpose of achieving the stated objectives of this study, various methods were used to collect the required data.

1.7.2.1 Questionnaire

Administration of questionnaires to the library users was done to:

- a) ascertain their use of the library and their specific information needs;
- b) find out their problems on the use of the present manual catalogue; and
- c) their views on the proposed system.

The questionnaire method was found more feasible especially in surveying the library users' needs. This is because, this method is more effective in reaching a large

number of users simultaneously. It was also more economical, both in time and money, since it does not require paying each one of the users a visit for an interview.

Several sources of information were consulted (including: Seetharama 1990; Lancaster 1977; Atherton 1977; and Kothari 1990) to formulate the questionnaires. Pre-testing of the questionnaires was done with a few users to identify any loopholes. The identified loopholes were rectified before the questionnaires were dispatched to the users. Both open-ended and closed questions were asked. This was done to reduce ambiguity and misinterpretation of the questions and consequently the answers.

The first set of questionnaires were distributed to the library users. Questionnaires were distributed with the help of some library staff members, from the readers service points like circulation and reference desk, to users who visited the library during the period of survey, and who were willing to complete the questionnaires. This was done to ensure high return rate of the questionnaires. However, some of the questionnaires were also distributed to users in their halls of residence as well as the offices. A total number of 155 questionnaires were distributed to the students; 10 at Kisii, 20 at Laikipia and 125 at the main campus. Thirty questionnaires were distributed to staff, both academic and non-academic staff. While 115 of the questionnaires distributed to students were returned, 23 were returned from staff members. Therefore, a total of 185 questionnaires were distributed out of which 138 were received.

The second set of questionnaires were distributed to computer vendors in Kenya, to find out what type of hardware and software they sell and what other related services they offer. It was not possible to get the total number of all the computer vendors in the

country. A sample of the vendors was selected randomly using addresses from newspaper advertisements. Seven questionnaires were distributed out of which four were returned.

Response from student users especially to the questionnaires distributed from the halls of residence was not very good. Response from computer vendors was also not good. Most of the computer vendors took a long time to reply and had to be visited several times before they completed the questionnaires. Samples of the questionnaires have been provided in appendices I and II.

1.7.2.2 **Interview**

It was found necessary to use the interview method where possible since, the two-way communication established during an interview is less likely to lead to misunderstanding and hence more likely to offer a complete picture of the situation unlike the other methods. "One can only get useful details about how a person consults a catalogue by asking him.....Interviews are more likely to produce better results" (Lancaster 1988).

Interviews were held with the librarians of the main library and the branch libraries. Interviews were also held with other library staff members, especially those in the technical section. This was done to find out their experiences while using the card catalogue in their daily activities. A few catalogue users were also interviewed after they searched the catalogue to find out whether their searches had been successful or not.

Before conducting interviews, interview guides were prepared accordingly. Interview guides with the librarians were sent to them in advance so that they knew the scope of the interview and hence prepare for the interview accordingly. Both structured and unstructured questions were asked.

Though most of the interviewees, especially library staff, were consulted in advance on the date and time of the interviews, some of them were not available for the interview at the scheduled time. For instance, during the time of research, 14 were working at the technical section, out of which only 10 were available for the scheduled interviews. Due to time constraint, only 10 users from main library and 10 users from branch libraries picked at random, were interviewed. The list of the people who provided information is provided at the appendix III.

1.7.2.3 Observation

The observation method was done to verify the data collected through other means as well as to get information that was not attainable through the other methods.

Observation method was used to observe library operations with special emphasis on the cataloguing functions and the use of the catalogue by library staff. The card catalogue was examined to establish the arrangement of the cards and to find out whether the catalogue was up to date or not. In addition, a few library end-users were observed as they carried out their searches either using the card catalogue or through the reference librarian. This was done unobtrusively so that their behaviour was not influenced by the

fact that their actions were being observed and recorded. The time for observation was chosen at random.

Observation was made of the users who approached the reference librarian to find out how they expressed their search queries, and try to establish their satisfaction and/or dissatisfaction in their search activities. This method was however not extensively used as it took a lot of time to observe any particular activity, and time was limited.

1.7.2.4 Literature Review

Literature review method was used to get a clear picture of the system being studied, as well as the system being proposed. The existing documents on the current library system were consulted in order to get a good grasp of the existing system. Sources of information consulted included annual reports, organizational charts, accession lists, annual calendars and catalogues. Existing documents about library automation with specific reference to OPACs were also consulted.

The major problem experienced with this method was that the Egerton University Library System documents and records were very disorganised. This made getting accurate data a difficult task.

The institutions that were sources of the literature materials include; PADIS, ILRI Library, Addis Ababa University Libraries and Egerton University Library.

1.7.3 Data Analysis Methods

After the data was collected, WordPerfect (version 5.1) software package was used to type the report, and Harvard Graphics (Version 2.3) software package was used to draw various figures. The questionnaire survey results were analyzed manually. Micro CDS/ISIS (version 3.07) was used to create the prototype databases, while ISIS/Pascal was used to develop the prototype OPAC program.

CHAPTER TWO

INFORMATION TECHNOLOGY IN AFRICA WITH SPECIFIC REFERENCE TO KENYA

2.0 INTRODUCTION

This chapter discusses application of IT in Africa, with specific reference to Kenya's situation. It particularly emphasises on library computerization in Kenya.

2.1 INFORMATION TECHNOLOGY IN AFRICA

Information is an essential commodity for social, economic, cultural, scientific and technological development of any country. It has even been accepted by experts and African leaders that, the biggest reason for Africa's underdevelopment is due to the lack of data availability, and when data are available, inadequate use of it (Woherem 1993). If the African economies are to improve, they need to have access to the same markets and adequate, accurate and timely access to the same information as the developed countries. Such access can only be achieved through utilisation of information technology (IT).

Africa realizes this and has tried to computerize some of its sectors. The first computers were introduced in Africa in the 1960s, and today there are many computer hardware and software vendors. The computer market in Africa is presently dominated

by the multinational corporations like IBM, ICL, Bull, WANG and NCR among others. The most widely used model is the IBM and IBM compatible computers (ECA/PADIS/SCH/VI/ST/4. 1994).

When computers were first introduced, the areas of application were mainly finance and statistics in the public sectors. With the availability of cheaper, smaller and more powerful microcomputers, combined with the growing awareness of the advantages of using computers the trend has changed (Kaul and Han Chun Kwong 1988). Today, various libraries and documentation centres in Africa are using computers for various activities.

2.1.1 Areas of IT Application in Africa

Africa has made great efforts to computerize its libraries and documentation centres. A survey carried out by PADIS in 1989-1990 of libraries and documentation centres in Africa, indicated that 75% of the surveyed centres were utilizing computers in their various operations. Most of these centres were using computers for various services including: providing current awareness lists for their users (44.2%); preparing computer generated bibliographies (72%); operating selective dissemination of information services (48.8%); providing question answer services (30%); and providing online searches (19.7%) (E/ECA/PSD.6/TP4 1994).

The survey further revealed that 11% of these centres were using mainframes, 17.4% minicomputers and, 93.5% microcomputers. In the bibliographic and library database management, most of the centres in Africa use CDS/ISIS in its micro and

mainframe versions either alone or in combination with MINISIS. The predominant operating software is MS-DOS. Windows is also becoming popular as more and more applications are being written for it. Macintosh is also popular in organizations that rely heavily on desktop publishing.

Online information services have become a major concern of scientists all over the world including Africa. These scientists seek access to bibliographic and non bibliographic databases for various purposes including: information searches on research already done to support new research; problem solving and decision making on investments and technologies that might meet economic development needs of Africa; and/or information on the development of scientific knowledge.

Provision of access to online information services has been supported by various agencies, for instance, Agence Francophone Pour l' Enseignement Supérieur et La Recherche AUPELF-UREF, a French-Speaking Higher Education and Research Agency based in Montreal Canada, has established a series of information centres for 14 universities in Africa. These are well equipped documentation centres which provide access to locally stored databases as well as online data and electronic mail services for their users, through packet switched access to the Minitel Videotex system and through temporary connections to the Internet over the PSDN (Jensen 1995). The United Nations Environment Programme (UNEP) hosts a full Internet connection at its head office in Nairobi which links via the Kenya PSDN to an internet Service in Norway. One of UNEP's priority is to provide cost effective online access to the UNEP environmental databases (Jensen 1995).

CD-ROM technology has also been introduced in many African institutions, for instance, the Kennedy Library of Addis Ababa University. This technology helps provide low cost information especially to institutions with inadequate collections and have difficulties in getting current journal articles or other source documents.

Desktop publishing is another area of IT application in African institutions. Several institutions in Africa are now doing desktop publishing to publish scholarly textbooks and proceedings, journals and newsletters. Through this technology, professionals and scientists provide teaching materials that may have more relevance for the students because the materials are selected by authors with local experience, giving examples from the African situation. They also publish and disseminate the results of their research hence share information with professional scientists within and outside their countries. Examples of institutions using this technology include, the University of Zimbabwe Faculty of Science and The African Academy of Science in Kenya.

Library automation is also one of the treasured applications of IT in Africa. There are wide ranges of applications for document analysis and library management including, the " traditional card catalogue which is giving way to computerised systems" (ECA/PADIS/SCH/VI/ST/2 1994). The American Association for the Advancement of Science (AAAS), is also encouraging the development of Co-operative catalogues to facilitate information resource sharing.

The efforts to computerize library and information systems in Africa has been assisted more by Regional and International organizations such as IDRC (International Development Research Centre), PADIS (Pan African Development Information System),

German Foundation for International Development (DSE), British Council and World Bank among others.

Development of local databases is also another potential area of IT application. PADIS has played a major role in establishing and maintaining databases in development information in Africa. PADIS maintains bibliographic databases for instance the PADdev, a bibliographic database for economic, technological and social development information in Africa; PADIS-COM a sectoral bibliographic references database that complement PADdev in fields like Agriculture, Industry, labour, social affairs and natural resources. PADIS has also databases from a variety of international and bilateral sources for instance, the POD-IN Africa database on population and development produced by the ECA population division. PADIS also maintains referral and numerical databases.

Presently online access to PADIS statistical, bibliographic and referral data is available at ECA headquarters in Addis Ababa, and by telecommunications link from organisations in participating centres where the databases have been installed . PADIS also plays a leading role in encouraging computer networking in Africa, for instance, the PADISNET formed in 1990 supported by IDRC, links 37 African countries into a network of participating development planning centres which exchange databases and information (Godard 1995).

According to Jacinta Were (1990), there are also a number of valuable bibliographic databases that have been developed by various organisations in Kenya, for instance, ICRAF, ILRAD, ICIPE among others, have good quality bibliographic databases. Were continues to say that, "the most effective and efficient way of developing

databases is through application of new technology, particularly use of computers" (Were, Co-ordination of bibliographic database 1990).

The future looks even brighter for Africa as the telecommunication system is also improving. Public Switching services have been recently installed in response to users' needs for data services. There are now quite a number of countries which have public Packet Switched Data Networks (PSDN) including, Kenya, Tunisia, Gambia, Zimbabwe and Egypt among others. About half of the African countries have reliable daily electronic mail links to the Internet for instance Tunisia, and South Africa." Current estimates indicate that there are over 300 users connected to these systems which are mostly open to the public even though they are usually operated by national universities and research centres" (Jensen 1995, 29). These developments have greatly improved access to information in Africa.

Development and improvement in Telematics in Africa is also gaining strength. Initially telematic users in most African countries had no option, but to make expensive international telephone calls to access services available in Europe and North America. With the advent of high speed modems, data can now be transferred much faster over the dial-up telephone networks. There have also been a number of successful small scale telematics projects, for instance, NGONET and ESANET, which have demonstrated the validity of low cost electronic communication. As a result, there have been a growing amount of support for consolidating these gains and expanding the available connectivity. Major sponsors for local infrastructure building projects include United Nations, the International Development Research Centre (IDRC) of Canada, and the French Overseas Research Organisation (ORSTOM) (Jensen 1995). There are also a number of African

countries that have access to Internet for instance, full Internet connectivity is available in South Africa for the academic and research community.

2.2 INFORMATION SYSTEMS IN KENYA

This section deals with the various information systems in Kenya as discussed in various sources of information including: Kariuki et al. 1988; Ng'ang'a 1990; Kimani 1990; and Rosenberg 1993.

2.2.1 Historical Background

Kenya has long realised the importance of information in national social and economic development. With this realisation, came the need to promote the collection, documentation and dissemination of information to all levels of users from students, researchers, and planners to the farmers, who need accurate and timely information for personal and national development (KLA 1989). To do this, there was need to establish libraries and information centres.

The history of library services in Kenya can be traced back to the 1900s. Libraries of specialised nature were the first to be established for instance, the library of Forestry department which was established in 1900s, the Kenya National Assembly Library in 1910. During that time, there were also libraries of public nature which grew up separately around different racial and religious communities, namely Europeans, Asians and Africans.

The public libraries grew up due to initiative of individuals or group of people for instance, the Seif Bin Salim Public Library and Reading Room which was set up in 1903 with funds from a group of Asians and the McMillan Memorial Library built by Lady McMillan in 1928 in memory of her husband (Muriuki 1984). The East African Literature Bureau (EALB) was one of them, set up in 1948 to publish suitable materials for East Africa and to encourage original writing by the indigenous African population. It also provided a rudimentary library service to outlying centres and to individuals by postal lending and book boxes. This service was finally taken over by the Kenya National Library Services which was established in 1965. University of Nairobi (then the Royal Technical College) library, was set up in 1956.

The growth and development of library systems initially had been slow due to lack of appreciation by policy makers for such services (Rosenberg 1993). It was not until 1965 that the Act of Parliament Chapter 225, of the Laws of Kenya, recognised libraries and set up the KNLS Board. In 1982, the Kenya Library Association (KLA) was also recognised and registered as a professional body.

Through the efforts of the Kenya Library Association (KLA), decision makers began to appreciate information centres hence giving them a substantial uplift. Today, the Kenya government supports various types of libraries, documentation and information centres including: academic libraries, public libraries, school libraries, special libraries, documentation centres, statistical bureau, national archives, national museums and publishing establishments. It also supports programmes and systems aimed at improving collection, storage and dissemination of information. This is demonstrated by its active participation in the AGRIS (International Information System for the Agricultural

Sciences and Technology); the New and Renewable Energy Resources Information Pilot Systems for Eastern and Southern African Region, and its moral support for PADIS (Pan African Development Information System). Internationally, Kenya participates in the initiatives of UNESCO's inter-Governmental council on General Information Programmes(PGI) (Kariuki et al. 1988).

The increase in the number of libraries in Kenya can be attributed to the fact that the public interest in libraries has greatly increased. There is now a healthier belief in the value of knowledge and in the importance of intellectual life in all centres of national activity than previously, when libraries were visited only by examination candidates.

The information systems and services in Kenya can be divided into various groups as will be discussed in the following sub-sections. Though Kenya does not have one comprehensive Information Policy, the government realises that legislative action is one of the prerequisites of a strong national information infrastructure. Therefore, it has several laws, regulations and guidelines that influence the operations and use of these information systems and services.

2.2.2 Public Libraries

Public library service planning and development in Kenya started in June 1959 (Muriuki 1984). The Kenya National Library Services (KNLS) provides the major public library services in Kenya. The KNLS was created in 1965 by the Kenya Parliament Act Chapter 225, of the Laws of Kenya. This library, set immediately after independence, was seen as part and parcel of the growth of African nationalism and the struggle for

independence. It was set up to provide information that would help sort out problems of national development.

The objectives of KNLS are to promote, establish, manage, maintain and develop libraries in Kenya. To achieve these objectives, the KNLS has various functions including:

- to plan and coordinate library, documentation and related services in Kenya;
- to advise the government, local authorities and other public bodies on matters pertaining to library and related services, including library education and training needs;
- to carry out and encourage research on the development of library and related services;
- to participate and assist in campaigns for eradication of illiteracy;
- to acquire books, materials and sources of knowledge produced in and outside Kenya, for a comprehensive national library service and;
- to publish the national bibliography of Kenya.

The KNLS is also a depository library for the purposes of the Books and Newspapers Act. Therefore, it serves both as a National and Public library. As a public library, the KNLS operates mobile library services from eight of its branches. It provides reading and lending services to both adults and children free of charge. In this way, it plays a leading role in the fight against illiteracy in Kenya. It also plays a leading role in support of school libraries.

Another public library service in the country is the MacMillan Memorial library in Nairobi, operated by the City Commission. It has two branches in Nairobi and offers adult and children library services to the public. It has a good collection of African materials.

These public library services are supplemented by foreign mission's cultural centres like the American Cultural Centre; the British Council Libraries in Nairobi, Mombasa and Kisumu; Goethe Institute; the French Cultural Centre; and the Indian Embassy Library which give library services to the public.

Most of these public libraries use the DDC in classifying their stock for easy retrieval by their clientele (Muriuki 1984).

2.2.3 Academic Libraries

2.2.3.1 University and College Libraries

There are various academic institutions in Kenya including the private and public Universities, the polytechnics, technical and teacher training colleges. All these institutions have libraries which can be called academic libraries. These libraries are integral parts of the institutions and reflect the goals and objectives of their parent institutions. Their main objective is to support the teaching, learning and research activities of the parent institutions. The rules and regulations governing development and use of each university library are developed by the parent university, which in turn is established by an Act of Parliament.

The academic libraries in the larger institutions for instance the University of Nairobi, the Kenya Science Teachers College, Egerton University, Kenyatta University and Jomo Kenyatta University college of Agriculture and Technology all use the Library of Congress Classification Schedules and subject Heading for their collections. The use of similar tools makes interlibrary loans much faster and hence utilisation of materials by their clientele from one institution to another much easier (Muriuki 1984).

2.2.3.2 School Libraries

In Kenya, there are various School Libraries which serve the community of their parent schools. These school libraries get most of their support from the Kenya National Library which distributes various types of books to these schools. The school library systems are especially well established in reputed schools and in schools in the urban areas, for instance, Lenana High School, Nairobi School, Kenya High School, Kianda High School, among others.

2.2.5 Special Libraries

As noted earlier, specialised libraries were the first ones to be established in Kenya. These are libraries established to serve the information needs of the special departments, private companies, parastatals and Non-Governmental Organisations (NGOs). These special libraries serve a special clientele with special interest within a specific subject area. These libraries include, research libraries serving the various research institutes, for instance, the Kenya Industrial and Research Institute library and the Kenya Agricultural Research Institute library. These support research activities

including collecting, organising and disseminating published and unpublished information or reports. They also offer special services like current awareness and SDI to their users. These are not guided by central government legislation but the institutions' rules and regulations.

The other library that can be placed under this category is the National Council for Science and Technology (NCST) library. NCST library was established to enhance the collection and dissemination of scientific and technological information. The NCST advises on all scientific activities including scientific documentation, statistics, survey and general information. The NCST operations and procedures are governed by the Science and Technology Act 1977, Chapter 250, of the Laws of Kenya, together with the NCST Report No.4. of 1980 on Science and Technology for development.

NCST has established the Kenya National Scientific Information Documentation and Communication Centre (KENSIDOC). KENSIDOC's objective is to provide the information services necessary for elaboration and implementation of Kenya's scientific and technological plans for socio-economic development.

2.2.6 Public Archives

These are concerned with preservation of important public archives and records created in various government ministries' departments, and other public institutions. Also included are, records of the High Court and of any other Court of tribunal, records of Parliament and the Electoral Commission; and records of any Provincial Council and/or

Local Authority. The operations of the Public Archives Service are governed by the Public Archives Act Chapter 19, of the Laws of Kenya.

2.2.7 General Information and Broadcasting Services

These services are under the Ministry of Information and Broadcasting, whose role is to establish a two way channel of information between the public and the government. It disseminates information on national policies and progress of developments; summarizes and interprets complex documents for dissemination, hence educating the public; and, ensuring that public issues are debated. The main organ for gathering and processing of news is the Kenya News Agency (KNA). The activities of the general information and broadcasting services are guided by three laws;

- The Kenya Broadcasting Corporation Act Cap 221, of the Laws of Kenya enacted in July 1964, which provides for public ownership and control of broadcasting by sound and television.
- The Film and Stage Plays Act Cap 222, of the Laws of Kenya commenced in October 1963, which provides for controlling the making and exhibition of cinematographic films and for licensing of stage plays, theatre and Cinemas; and,
- The Books and Newspapers Act Cap 111 of the Laws of Kenya, which was enacted in July 1960. This deals with the deposit and registration of books and papers and regulates printing of the same. In accordance with this Act, publishers were required to deposit 3 copies of each book they publish to the registrar of

societies. The copies were then deposited in Kenya National Archives, KNLS and Nairobi University Library. This was for the purpose of building a Kenya National Bibliography. But this was not satisfactory and as a result, this act was amended in 1981 and now publishers are required to deposit two copies directly to the Director of Kenya National Library Services (KNLS).

2.2.8 Multi-Sectoral District-Oriented Information Services

The government has established one District Information and Documentation Centre (DIDC) in each district, to support the planning and implementation of development activities at the district level. The DIDC provide essential information and baseline data for the DPU (District Planning Unit) and District Development Committee. It also serves as a reference centre for providing up-to-date development information on the district to the Ministry of Information and Broadcasting and other public media, like local newspapers.

There are also Government Extension Services established to disseminate information to the large segment of Kenya's population, which is illiterate especially in the rural areas. These services mostly deal with agricultural and livestock development.

2.2.9 The National Museums

The national museums were established under the national Museum Act of Parliament, Cap 216 Laws of Kenya, which was enacted in 21st Jan 1983. Their role is to:

- establish, in consultation with the NCST, institutes of research;
- undertake, in consultation with the NCST research in natural history and conduct other scientific or cultural activities; and
- disseminate knowledge on matters of scientific, cultural, technological or human interests by means of lectures, special exhibits, conducted tours and publications.

2.3 INFORMATION TECHNOLOGY IN KENYA

This section gives a brief overview of the IT application in Kenya: the historical background; state of the art of library computerisation in Kenya; and the future trend; and the telecommunication system. This information was obtained through literature survey, and the major sources of information include Were 1990, Were 1988, Kamau 1989, Kyarie 1995 and Government of the Republic of Kenya 1994/96.

2.3.1 Historical Background

Computers have now become a familiar technology in Kenyan Society. According to Mwara (1986), the history of computers in Kenya started way back in 1953 when punch cards tabulators were introduced in Government offices and E.Africa Railways, now Kenya Railways.

By 1982, there were about six computer bureaus in Kenya and about 20 freelance individuals. More modern methods of data communication were being introduced, such

as key edit (key to tape) and key to disk, in some cases with online real time processing, instead of the punched card, paper tape and magnetic tape backing store of the 1970s (Mwara 1986).

Since then, the computer industry has advanced very well especially in the urban areas. Today, major international computer manufactures like IBM, WANG, ICL, NCR, DEC, etc. are well represented in Kenya (Were 1990).

The first mainframe computer was introduced in Kenya in 1961. In 1965 there were 4 mainframes, in 1975 30, and by 1981 there were 127 mainframes. In 1985, it was estimated that there were about 2000 computers in East Africa, 90% of which were in Kenya, while Uganda and Tanzania shared the remaining 10% (Kariuki et al. 1988). The number of mainframes has continued to increase steadily by about 28% and forecasts are that there will be about 12640 by the year 2000 (Kamau 1989).

Minicomputers were introduced in the market in the 1970s, while microcomputers were introduced in the 1980s. The microcomputers have now flooded the market reducing the prices tremendously. In 1990, there were about 1000 microcomputers in Kenya.

The utilization of computers was initially restricted to business organisations, the government offices, banks and a few educational institutions. Major operations included general in-house administrative functions like payrolls, invoicing, inventory control as well as real time customer service in finance, banking and travel trade. Since then, the trend has changed and various libraries and information centres are now using computers.

2.3.2 Application of Computers in Libraries in Kenya

Though the first computer was introduced in Kenya in 1961, it was not until late 1970s, that library automation began in Kenya. Most of the libraries started computerization in 1978 and between 1983 and 1987, a number of them had purchased computers. Due to lack of resources, the government's support for libraries was elementary, concentrating mainly on stock building as a priority. In government financed organizations, information technology (IT) in libraries was and still is, mostly achieved through donors.

The first libraries to take advantage of IT in Kenya therefore were international organizations and national research libraries. The United Nations Environment Program (UNEP) library, had its first installation in 1984. During that period, there were traces of computer projects in certain libraries using batch mode system on mainframe computers. The University of Nairobi had a project to compile a union list of periodicals in Eastern African Libraries. The project was handled by the university's computer centre which had an ICLC 2950 computer. Since then, there has been some progress in library automation as "it dawned upon librarians that they too must join the race in using computers to improve their services" (Were 1990).

Though there are many computer vendors in Kenya, none of these ventured in library systems software. With the librarians' increasing awareness of the need to computerize their systems, the demand for library systems and software has increased. However, this demand is without the supply to match it. As a result, most libraries that

have attempted automation have had their systems imported directly from overseas manufactures.

The early mainframe based systems used in-house packages written by programmers in the computer centres. These packages were tailored to specific needs and ran on specific machines. However, dependence on in-house systems developed by particular individuals to run on a particular machine, sometimes leads to incompatibility problems, especially when acquisition of new and different machines and/or software is desired. Commercial packages were introduced into Kenyan libraries in the mid 1980s. The International Organisations' libraries were the first to start using standard Database Management Systems (Were 1990).

ICRAF (the International Centre for Research and Agroforestry) started using computers in 1985. ICRAF being a research institution, efficiency in literature searching is an important factor in the library's services. It installed dBase II in 1985 for information storage and retrieval. dBase had some limitations and ICRAF changed to Knowledge Man, a software which also proved inefficient. In 1986, ICRAF installed CDS/ISIS. The library has since then created over five bibliographic databases including: the accessions list which gives full bibliographic citations of books, reprints and non-conventional documents received by the library; and the library catalogue database which represent the Library's holdings. Currently ICRAF has a large number of PCs some with CD-ROM readers (Were 1990).

The Library of Congress (LC) library office in Nairobi, representing the LC in Washington DC, installed dBase III in 1986 on WANG PCs of 30 MB. Initially the

computers were used for a publishers' directory, serials supplement, statistics and accounting purposes. Currently LC library maintains databases of references to African publications and several related databases such as: Accession lists, authors database, publishers database and quarterly index. Database managements systems currently in use are dBase III and CDS/ISIS.

During the period, 1985/86, off the shelf library software packages emerged. The International Laboratory for Research on Animal Diseases (ILRAD) library purchased the InMagic Software in 1985 and installed it in 1986. Currently ILRAD library use CDS/ISIS for its databases and the GIS software. The initial aim of the library was to improve the acquisition system. Since then, they have developed a database for the library's holding. They also use the software for serials control.

ILRI (International Livestock Research Institute) headquarters library based in Nairobi, uses CDS/ISIS for its databases and the GIS software programs, ArcInfo. It has about 100 databases in the field of Livestock Research. It uses both high-end PCs and UNIX workstations. ILRI is currently leasing a line to the CGNET Internet hub, giving a 9600 bps link to the Internet. ILRI's documentation centre produces printed annotated bibliographies on topics of particular interest to ILCA. Recent bibliographies are available as computer-readable databases.

The International Centre of Insect Physiology and Ecology (ICIPE), installed the same software (InMagic) in 1987. This software runs on a WANG PC microcomputer with 156 KB of memory and 10 MB hard disk. The purpose for the computer installation was information storage and retrieval.

The African Council on Communication Education (ACCE), a non-profit making Non Governmental Organisations (NGO) centre for promoting communication training and development in Africa, also installed dBase III on two IBM/XT/AT microcomputers in 1985. These were mainly used for information storage and retrieval purposes.

The United Nations Human Settlements (HABITAT), installed Micro CDS/ISIS in 1986 on an IBM/AT with 20 MB of hard disc. The main aim was to offer information storage and retrieval services. The International Development Research Centre (IDRC) regional office in Nairobi, installed the Micro CDS/ISIS in 1988 on a shared IBM/XT.

The American Cultural Centre (AMERL) library installed a Hitachi CD-ROM on IBM PC in 1987. The library does searches for individuals as well as institutional users on request.

The Environmental Liaison Centre International (ELCI), an NGO centre for researchers interested in environment installed dBase III plus in 1987. In April 1988, they changed to Micro CDS/ISIS. Currently ELCI uses dBase IV for a database containing about 6000 profiles of NGOs (about 11 MB). It also contains a database of 3000 titles in ELCI's own library.

The University of Nairobi installed, CDS/ISIS in 1988 on a Neptune/XT Microcomputer (IBM compatible). This was to compile a national bibliography for Kenya. Unfortunately this bibliographic project was discontinued due to lack of funds. The library is now planning to computerise, and intends to use a complete Library

Management System for instance TINlib, consisting of computerised inventory, circulation and acquisition systems (Were 1990).

The Kenya Technical Teachers College (KTTC) has an in-house developed acquisitions system. This was written in COBOL to run on a Kaypro micro with 640 KB and a 10 MB of hard disc.

KARI (Kenya Agricultural Research Institute) also maintains a large database (KARD), on agricultural research literature. KARD is implemented in CDS/ISIS version 3.07 on a 386 PC and contains about 40,000 records containing title keywords, location and full abstract. Part of this information has been entered manually and part of it downloaded from CD-ROMS.

Moi University library has also computerised its operations and it is now inputting data. The software package being used is TINlib software. The library has installed microcomputers that are networked using the Novell Netware. Retrospective conversion was started in 1992 and over 17,700 records have been created so far. Personal conversation with Mr. Khamadi of Moi university revealed that the OPAC will start operating as soon as 75 % of the library materials have been entered.

Table 2.1 gives a summary of the computerised libraries in Kenya, showing the hardware and software in use, and the computerised operations.

Table 2.1. Computer Application in Kenyan Libraries

Source : Were 1990 and Kamau 1989

Library	Hardware	Software	Functions
ACCE	Micro	dBase	Information storage and retrieval
AMERL	Micro	CD-ROM	Information search
ELCI	Micro	CDS/ISIS	Information storage and retrieval
HABITAT	Micro	CDS/ISIS	Information storage and retrieval
ICIPE	Micro	In-Magic	Catalogue, SDI profiles
ICRAF	Micro	CDS/ISIS	Catalogue
ILRAD	Micro	In-Magic	Cataloguing, serial control, Book orders
LC	Micro	dBase	Information storage and retrieval
KTTC	Micro	In-House	Acquisition
UNEP	Micro	CDS/ISIS	Catalogue, periodical holdings list, Acquisition, word processing
Nairobi Univ	Micro	CDS/ISIS	Union list of periodicals in Kenyan libraries, statistical data
Moi Univ	Micro	TINlib	Cataloguing, Acquisition, Circulation, OPAC.

2.3.3 Future Trend

As observed above, most of the computerised libraries in Kenya use the Micro CDS/ISIS software. This software was introduced to Kenya in 1986 by UNESCO. The WANG version of Micro CDS/ISIS was installed in UNEP, on a 10 MB WANG PC. This software was a big success at UNEP and through the Nairobi Library Automation Group, other libraries have adopted the package and like in other African countries its use has been widespread.

The KENISIS Micro CDS/ISIS user group in Kenya is helping in training of staff in the information institutions as well as in providing voluntary technical support to information centres. This, together with its availability (cost free) to non-profit making

organisation of Unesco member countries and also the software's good facilities, has encouraged most libraries to adopt it for their functions (Were 1990). Due to these factors, it is likely that more and more libraries in Kenya would install this software.

The introduction of microcomputers in the market further encouraged the computerization of libraries due to their decreased costs, increased power, portability and user friendliness (Kariuki et al. 1988). Use of microcomputers have particularly been encouraged by the financial constraints that made librarians look for cheaper and more manageable systems. In addition, most information centres in Kenya operate on small scale, making use of microcomputers even more feasible.

Most of the computerised libraries in Kenya started off with computerizing the catalogues and the periodicals holdings. Most of them developed specialised information retrieval systems for their clientele who are able to search their in-house databases using boolean logic (Kamau 1989).

Some of the special libraries also carry out computer based literature searches on established relevant bibliographic databases abroad. This is done by delegating such searches to services abroad at a cost (Kamau 1989).

The role of information services in Kenya is getting more appreciation and automation of their services is no longer a luxury. Initially, library automation was mainly concentrated in special libraries or documentation centres affiliated to private, parastatal organisations and research institutions. Now, the academic libraries too are

joining the race of computerisation to improve on their services and hence enhance economic and social development of the nation.

A preliminary survey carried out by Kamau on library computerization in Kenya, shows that most libraries plan to computerize their libraries within the next few years (Kamau 1989). Computerisation should be encouraged not only for NGO libraries but even for the University libraries because, "if and when all Kenyan libraries are computerised, they would easily be able to compile lists of publications produced in their parent institutions which would be used for the composition of a more comprehensive national bibliography" (Kamau 1989). In the process, these libraries would be in a better position to share their scarce resources. Information resource sharing and utilisation can be further enhanced through activities like the production of a union catalogue; development of selective dissemination of information (SDI) services and general improvement of the services. The need to share resources in academic libraries should not be undermined especially in developing countries where resources are limited.

In order to share these resources through the Union Catalogue for example, University libraries in Kenya have to computerise their operations and services and in particular, online access to information.

The following libraries are planning to computerise their library operations in the near future (Kamau 1989):

- British Council Library;
- Dayster Communications;
- Egerton University;

- University of Nairobi;
- Kenya Bureau of Standard Library;
- Kenya Industrial Research and Development Institute (KIRDI) Library;
- Kenya Medical Research Institute (KEMRI) Library.

According to this trend of IT application it can be said that, most libraries including academic libraries are going to be computerised in the near future.

2.3.4 Telecommunication System in Kenya

Telematics (a combination of telecommunication and computer technology), plays a major role in library automation. Today, information is processed using computer and transmitted through telephone networks. Good telecommunication infrastructure is therefore imperative for successful library automation, and in particular, online retrieval services. The postal services too play a major role in library and information centres in Kenya, for communication and document delivery. Kenya has therefore made efforts to develop and improve the Kenya Posts and Telecommunication (KP&TC) services. We shall briefly view some of the developments taking place in this area.

The Kenya Posts and Telecommunications Corporation (KP&TC) is responsible for the provision of posts and telecommunications services, and the control of radio communications operated from or received in Kenya. The KP&TC was founded under the company Act in 1978.

Since then, the corporation has expanded its posts and telecommunication services to cater for the needs of the Kenyans. The total number of post offices increased by 16.6% rising from 731 in 1982 to 852 in 1986. In 1990 there were 1,025; by 1994 1,190; and this is expected to reach 1,360 by 1996. The KP&TC intends to extend the number of destinations for the Expedited Mail Service (EMS) from 55 countries in 1994, to 77 countries end of 1996 (Kenya Development Plan 1994).

In addition to expansion of the postal services infrastructure, the development of telephone exchange services has also been given considerable attention by KP&TC. The public telephone booth system has grown and together with the introduction of the telephone cards, the public access to telephone facilities have been improved. Telephone connections grew by 9% per annum increasing from 145,270 lines in 1987 to 200,220 lines in 1991. The telephone lines are expected to expand to 1.5 million by the year 2000 (Government of the Republic of Kenya 1994).

The KP&TC plans to increase the number of circuits linking Kenya with Africa and the rest of the world. The number of direct circuits are expected to rise from 110 in 1994 to 121 by 1996 within Africa.

The government also recognises the importance of communication to the rest of the economy and this is true from its support through the KP&TC for:

- the local manufacture of telephone exchanges and receiving equipment project based at Gilgil aimed at satisfying the domestic market;
- Intensified Research and Development (R & D) in the fast changing transport, communication and the information subsector; and

- Schools like the Kenya Institute of Mass Communication, which produce qualified professionals and technical personnel capable of handling production and dissemination of information using relevant technology in a rapidly changing environment.

Satellite communication was introduced in 1970, with the launching of Longonot Satellite Earth Station which enabled Kenya to communicate with the rest of the world (Wanjau 1992). The satellite systems have facilitated introduction of new services such as the International Telephone Services Centre (ITSC) and a message switching centre.

There has also been some improvement on communication through use of telematics (the combination of telecommunication and computer technology). According to James Kyarie (1995), developments in telematics in Kenya has ensured the provision of services like:

- Public Switched Telephone Network (PSTN);
- Public Land Mobile Network (PLMN) with a capacity of about 2,000 lines;
- Direct dialling International Telephone services;
- Packet Switched data services;
- Internet, though not very popular yet;
- VSAT (Very Small Aperture technique) services are available, and are gradually becoming popular especially with the banks;
- There are also efforts to provide broadband transmission systems using fibre in the cities and digital radios across the cities (Kyarie 1985).

2.3.5 Human Resource development

For application of IT in libraries to succeed, there has to be adequate qualified personnel. Unfortunately there is lack of manpower in Kenya to man the library systems. Most professionals are either computer specialists or traditional librarians. Yet "the ideal person for library computerization is one who is a professional in information science as well as in computer Science. Such people are hard to come by in Kenya" (Kamau 1989).

Initially the library staff were getting training from modern syllabi in library schools in developed countries and also Makerere University in Uganda. However, the future looks brighter as today, there are various information and library training schools and colleges in Kenya. Examples are:

- The Institute of Computer Science of the University of Nairobi which provides undergraduate in-service courses and a postgraduate diploma in computer science.
- Kenyatta University which offer a course in library studies at Masters level.
- Moi University introduced a Bachelor Degree course in Information and Library Science in 1988. A Master of Philosophy degree program was also started in 1993. The University intend to start a PhD. program soon too.

- Kenya Polytechnic offer Certificate and Diploma level courses in library science and computer literacy.
- Mombasa Polytechnic also offers Diploma and Certificate level courses for IT professionals.
- ICL Kenya ltd, NCR Computer Science Institute and Computerland Engineering offer private training on use of IT to professionals.
- Private library and IT training institutes such as, the School of Professional Studies (SPS), Graffins College, and City College, in Nairobi which offer computer literacy courses and library studies at Certificate and Diploma level.

There is computer literacy campaign that has been a big success with computer training centres in the country, even for children, being set up. This has encouraged computerization in many organizations (Were 1990).

There are various organisations and agencies which, in collaboration with the Kenya Library Association, have contributed significantly to organising and funding continuing education activities for information professionals in Kenya. These include, the World Bank, British Council, German Foundation for International Development (DSE), United States Information Services (USIS) and PADIS.

Basing our arguments on this background, we can say that the future looks brighter for Kenyan libraries including the academic libraries. It is within this environment that Egerton University Library Systems plans to computerise its operations.

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CHAPTER THREE

EGERTON UNIVERSITY LIBRARY SYSTEM

3.0 INTRODUCTION

This chapter provides information on the Egerton University Library system. Major sources of information included printed documents on Egerton University library system, for instance, the Library Development Plans and annual reports, as well as personal conversation with the librarians.

3.1 HISTORICAL BACKGROUND

Egerton University is situated in Njoro, Nakuru District in Kenya. Egerton University, formerly an agricultural school was founded in 1939 when Lord Egerton of Tatton, Britain, donated about 1,000 acres (400 hectares) of his farm to the government, Department of Agriculture, for the establishment of an agricultural school. In 1955, the government handed over the management of the school to a board of governors. A further 3,000 acres (1,200 hectares) of land, was bequeathed to Egerton Agricultural School by Lord Egerton, through his will dated 14th December 1954, after his death in 1958. The Board of Governors received the farm from the executors of Egerton's will on 1st Feb. 1960. Between 1963 and 1983, the school acquired an additional land of 84

acres bringing the total acreage to about 4000 acres (1,600 hectares) (Laws of Kenya 1962).

The initial objective of this school was to provide training for European settlers and the colonial civil servants. The first students were three British ex-service men returning from World War II, who were being prepared for farming in the Kenya highlands. Dr. D. Gerald Burton, seconded from Njoro Plant Breeding station was the first Principal. By 1943, the number of students had increased to about 40, under the Principalship of Mr. O.T.Davis. Between 1943 and 1949 the number of students significantly increased from 40 to 110, under the Principalship of Mr. E.J.P.Booth.

Most of the students enrolled for either short courses of up to three months or a one-year certificate course in general agriculture. In 1948, the one-year certificate course was turned into a two-year Diploma course, but the short courses were still being offered. The first diploma students graduated in 1952. During that time, the name of the Egerton Agricultural School changed to Egerton Agricultural College. This was later legalized by an Act of the Parliament dated 12th July 1955.

Between 1952 and 1962, the college attempted to increase the scope of its training programmes by making its courses more comprehensive. This was made in order to meet the challenges of the rapidly developing agricultural production, which made the need for other diploma courses apparent. In addition, in 1960, it became obvious that Kenya's political independence was inevitable, and the Act of the Parliament was amended to allow the college which was up to then an exclusive European preserve, to admit indigenous Kenyans. These Kenyans were required not only to fill the gap of the

departing expatriates, but also to man various other specialized areas in the agricultural sector. In 1962, diploma courses in Animal Husbandry, Dairy Technology and Forestry were introduced.

At independence in 1963, the Kenya government also realized that agriculture was, and still is, the mainstay of Kenya's economy. Therefore, development of the agricultural sector was, and still is, the base for the development of other sectors of the economy. In view of this, the college had to diversify its diploma programmes to cater for the various sectors of agriculture. From 1963, several courses were introduced in rapid succession as follows:

1963 - Agricultural Engineering;

1965 - Range Management;

1967 - Farm Management;

1968 - Agricultural Education and Home Economics;

1970 - Horticulture;

1978 - Food Technology;

- Farm Power and Machinery;

- Soil and Water Engineering;

- Animal Health; and,

1980 - Ranch Management;

- Wildlife Management;

- Agriculture and Food Marketing;

- Forestry.

The expansion and diversification of Diploma programmes, led to a corresponding increase in the number of students from 110 in 1949 to 215 in 1963. In 1966 when Mr. William Odongo Omamo took over the college as the first African Principal, the student enrolment rose from 215 to 334. By 1969 there were 595 students under the Principalship of Mr. P.T. Obwaka. Between 1979/80 and 1983/84 academic years, the enrolment almost doubled.

Since then, the college has trained students from a number of African countries including: Kenya, Nigeria, Zambia, Tanzania, Uganda, Zaire, Rwanda, Burundi, Swaziland, Botswana, Malawi, Lesotho, Sudan, Cameroon, and Namibia among others.

In 1986, the college was granted the University College status and the first batch of 137 degree students were admitted in September 1986. In 1987, the University College was granted full university status by an Act of the Parliament. The academic programmes have since then, diversified to include Degree and Masters programmes in other fields like Pure and Applied sciences, Arts and Social Sciences.

The university has continued to grow in terms of students and staff numbers, as well as the physical facilities. Egerton university has now expanded to include two branches, Laikipia and Kisii Campuses. Laikipia campus situated in Nyahururu, was established in 1990, and Kisii campus at Kisii town, was established in 1993. The two are approximately 85 and 250 Kilometres away respectively, from the main University Campus situated in Njoro.

In 1988/89 academic year there were 850 students pursuing diploma courses and 3120 undergraduate students pursuing degree programs. In 1994/95 academic year, the student population had risen to 4,897 at Njoro; 989 at Laikipia and 186 at Kisii, making the total University student capacity of 6072. The University has a total staff population of 3274; 695 teaching staff and 2579 non-teaching staff.

Egerton University Library System establishment can be traced as far back as the establishment of the college. In the mid 1960s, the library had only 3,500 volumes of books and 500 bound periodicals. Then, the library used to be operated on a closed access system. However, with the increase of the users and hence increased demand for services, the library's operations became open access from early 1972. The readers were then in a position to consult the catalogue and check for the materials they needed from the shelves. The library became a university library in 1986, when the Agricultural College was granted the University College status. Since then, the library system has expanded to include: the Main Library; two branches, Kisii campus library and Laikipia campus library; and three departmental libraries - Faculty of Arts and Social Sciences (FASS) Library, Utafiti library, and Centre for Women Studies and Gender Analysis (CWSGA) Documentation Centre.

A summary of the Library system's information materials and human resources is given in section 3.3.

3.2 OBJECTIVES OF THE LIBRARY

Information obtained from the Egerton University Library Development Plans and through personal conversation with the acting university librarian, revealed that, the main objective of the library is to support teaching and learning activities and the various research projects carried out in the University. It does this by providing information on various disciplines offered in the university. To achieve this objective, the university library has several specific objectives which include:

- a) To collect and organise resources of recorded information in accordance with the academic aims and needs of the University.
- b) To promote use of these materials in the best interests of learning, scholarship and research activities of the university, and in the process participate in the discovery, transmission, and preservation of the knowledge and hence, stimulate the intellectual life, economic and cultural development of Kenya. The library promotes use of these materials by several categories of users namely:
 - the teaching staff, for preparation of their course materials;
 - the administrative staff, in enhancing the performance of their administrative and executive responsibilities;
 - the technical staff in preparation of their daily activities;
 - the students in their self learning activities and preparation for their term papers and research reports;
 - the researchers in their day-to-day research activities.

- c) To provide advisory and enquiry services to assist staff and students in the pursuit of their aims.
- d) To provide ready access to a much wider range of materials and recorded data from outside its stock through interlibrary loan services. Through the interlibrary cooperation, the library also extends its services to other libraries.

3.3 ORGANISATIONAL STRUCTURE OF THE LIBRARY SYSTEM

This section describes the structure of the Library System which consists of five libraries, namely The Main library, Laikipia library , Kisii library, FASS library, CWSGA library, and Utafiti library. The organisational structure has been illustrated in Figure 3.1. Figure 3.2 gives a summary of the library system's resources.

3.3.1 Main Library

The main Egerton University library is situated at Njoro, Nakuru District. It was established in the early 1950s, and has a staff population of 63. It holds a total collection of about 90,000 books and 3,000 volumes of bound periodicals. It has about 800 periodical titles. Apart from books and periodicals, the library holds research reports and thesis reports of the academic staff of the university. The library also serves as a depository library for Food and Agriculture Organization (FAO) and World Bank

Publications. The library therefore has about 8000 pamphlets, technical and research reports.

These information materials are available to the Egerton university community. They are also accessible to some authorised outsiders for bonafide study. An example of outside library users are staff from the Rift Valley Institute of Technology and Njoro Plant Breeding Research station. The approximate user population is about 8,500 both staff and students. The seating capacity in the main library reading room is about 750.

The Main University Library shares its resources with the branch libraries. When Laikipia campus became an integral part of Egerton University, quite a number of books especially in Education were transferred from Main library to that college. When FASS library was officially opened in 1994, the Main library also transferred some books in the social science disciplines to that library. The library does the major acquisition of materials which it distributes to the branch libraries, though the branch libraries sometimes acquire their own materials.

The University library is also engaged in inter library loan activities with the other university libraries like Nairobi, Kenyatta University and Moi University libraries; as well as with its own branch libraries like Laikipia and Kisii.

The current source of finance is the Kenya Ministry of Education through Egerton University. The Library is allocated funds each year by the University through the vote system. These funds are used for all the library operations including purchase of books. The library earns a small income from long overdue fines and the photocopying bureau.

The library also gets donations from different organizations, and institutes for instance, the World Bank. A few individuals, for instance, Dr. Taita Toweet and Daisaku Ikeda have also donated quite a number of books to the library.

3.3.2 Branch Libraries

As already mentioned in section 3.3.1, Egerton University Library has two branch libraries, Laikipia and Kisii libraries.

3.3.2.1 Laikipia Campus Library

Laikipia Campus situated at Nyahururu, was formerly a Diploma level Teacher Training College, which was upgraded to a University college in 1990. The course offered in this campus is Bachelor of Education Degree (Arts). It has a total of 989 students.

The former Laikipia College Library became a campus library in 1990. The library has staff population of 17. The information materials held in the library are print materials like books, periodicals including newspapers and magazines, maps and atlases, and research reports mainly in Education. However, plans are underway to acquire audio visual materials. The total collection is approximately 13,078 books, about 2000 periodicals and bound newspapers, and about 1333 pamphlets, research and technical reports.

Materials acquired directly by this library or received through donations, are catalogued using the AACR2 and classified using the LC classification system. However, some of the books come from Main library already processed. The book charging and discharging system is the duplicate slip system discussed in section 3.5.3. The seating capacity in the reading room is about 300 for a user population of about 989.

3.3.2.2 Kisii Campus Library

Kisii campus library, former Kisii College library, was established in 1965 when the college was a P1 Teachers' Training College. It started with a small collection in a small reading room which was managed by a teacher. It became a University Campus library in 1994 when the college became part of Egerton University. It has 12 library staff members.

The type of information materials held in this library include: textbooks on primary school courses, secondary school level as well as Diploma level text books in Education; research projects reports; periodicals, like Educational periodicals as well as magazines and newspapers, like The Time magazine, economic reviews, weekly reviews, dailies etc. There are also audio visual materials that are currently at the Learning Resource Centre (within the campus), where users are directed to on request of particular information.

The total collection is about 9,000 books and over 95 volumes of journals. The source of these information materials were mostly donations from individuals as well as

organisations such as the British Council. Currently, Egerton University is responsible for the purchase of most of the materials.

These information materials are catalogued using AACR2 and are classified using the Dewey Decimal classification. The book charging and discharging system is the Browne system, discussed later in section 3.5.3.

There are 186 students in the college, who are all members of the library. The college also has 139 non academic staff, some of which are members of the library. The academic staff number is included in the Main Library's staff population. The total user population is about 236. The seating capacity in the reading room is about 100.

The source of finance for this library is the Ministry of Education through the Main Egerton University.

Due to the upgrading of the college from a diploma level college to a university campus, the library is not able to adequately meet the needs of its users. Hence, it frequently engages in interlibrary loan with both the Main library as well as the Laikipia library. Books obtained through interlibrary loan are put on reserve for a period of time, from where they are lent out to the users for a maximum period of two hours.

3.3.3 Departmental Libraries

The Library System has three departmental libraries; FASS, Utafiti and Centre for Women Studies and Gender Analysis Documentation Centre.

3.3.3.1 Faculty of Arts and Social Sciences (FASS) Library

This library was established in 1994 and is situated at Njoro, in the Main University compound. It holds mostly Social Sciences and Literature and languages books. The library has 17 staff members.

The information materials held in this library include books, Journals, and non book materials like research papers mainly in the field of agriculture. The library collection is about 1,500 books and 100 journals.

The library does cataloguing and classification of its library materials, using AACR2 and the Library of Congress classification schedules and subject heading.

This is the only library at Egerton University that has so far attempted some computerisation. There are two computers in the library, one IBM PS 50 286 processor and one Gateway 2000 486 DX with CD-ROM drive. These computers are used for cataloguing, and information storage and retrieval. The software packages used are CDS/ISIS Version 3.07, and SPIRS for CAB CD-ROM searches.

Sponsors of this library include, CYMMIT (Centro Internacional de Mejoramiento de Maizy Trigo), KARI and Egerton University.

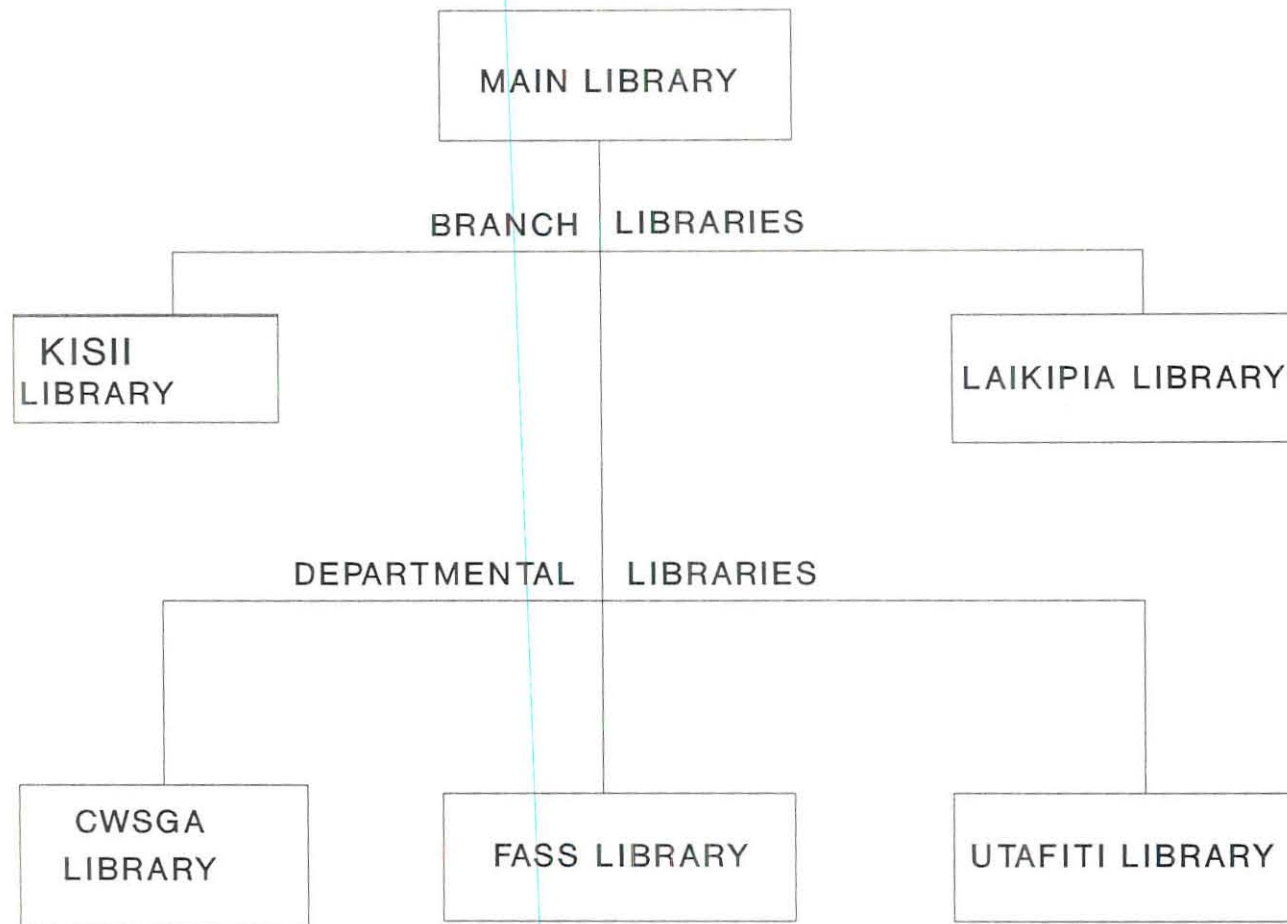


Figure 3.1 ORGANIZATIONA STRUCTURE OF THE LIBRARY SYSTEM

3.3.3.3 Centre for Women Studies and Gender Analysis

Documentation Centre (CWSGA)

This Centre was established in 1992. The type of information materials held in this Centre include pamphlets, books, journals, magazines and other periodicals, mainly on women and gender issues. The source of the information materials is the Main University Library, and occasionally donations from Organisations like World Bank, Winrock International and USAID. These materials are catalogued and classified using AACR2 and LC subject heading and classification schedules. The source of finance is the University as well as donors from different organisations.

The Library System's Book Collection

Main Library (including FASS library)	90,000
Laikipia Library	13,078
Kisii Library	9,000
Utafiti Library	1,500
Total	113,578

The Library System's bound Periodical Collection

Main Library (including FASS)	3000
Laikipia	2000
Utafiti	100
Kisii	95
Total	5195

Pamphlets and Research and Technical Reports

Main Library (including FASS)	8000
Laikipia	1333
Utafiti	250
Kisii	-
Total	9583

Figure 3.2 Summary of the Library Systems's Resources

3.3.3.3 Centre for Women Studies and Gender Analysis

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Kisii	-
Total	9583

Figure 3.2 Summary of the Library Systems's Resources

Table 3.1: The Library System's Staff

Source : Egerton University Annual Report 1994

Designation	Numbers	percentage
Senior asst librarian	3	2.8
Assistant librarians	3	2.8
Senior library assist'	11	10.5
Library assistants	32	30.5
Library attendants	37	35.2
Secretaries	3	2.9
Typists	2	1.9
Binders	4	3.8
Messengers/cleaners	10	9.5
Total	105	100

3.4 FUNCTIONAL ORGANISATION OF THE LIBRARY

This section gives the major functional sections of the libraries. All the libraries have the same functional organisation, and the functions discussed here are performed in all the libraries. The Library is divided into four main functional divisions as discussed in the following subsections. Figure 3.3. also illustrates the functional organisation.

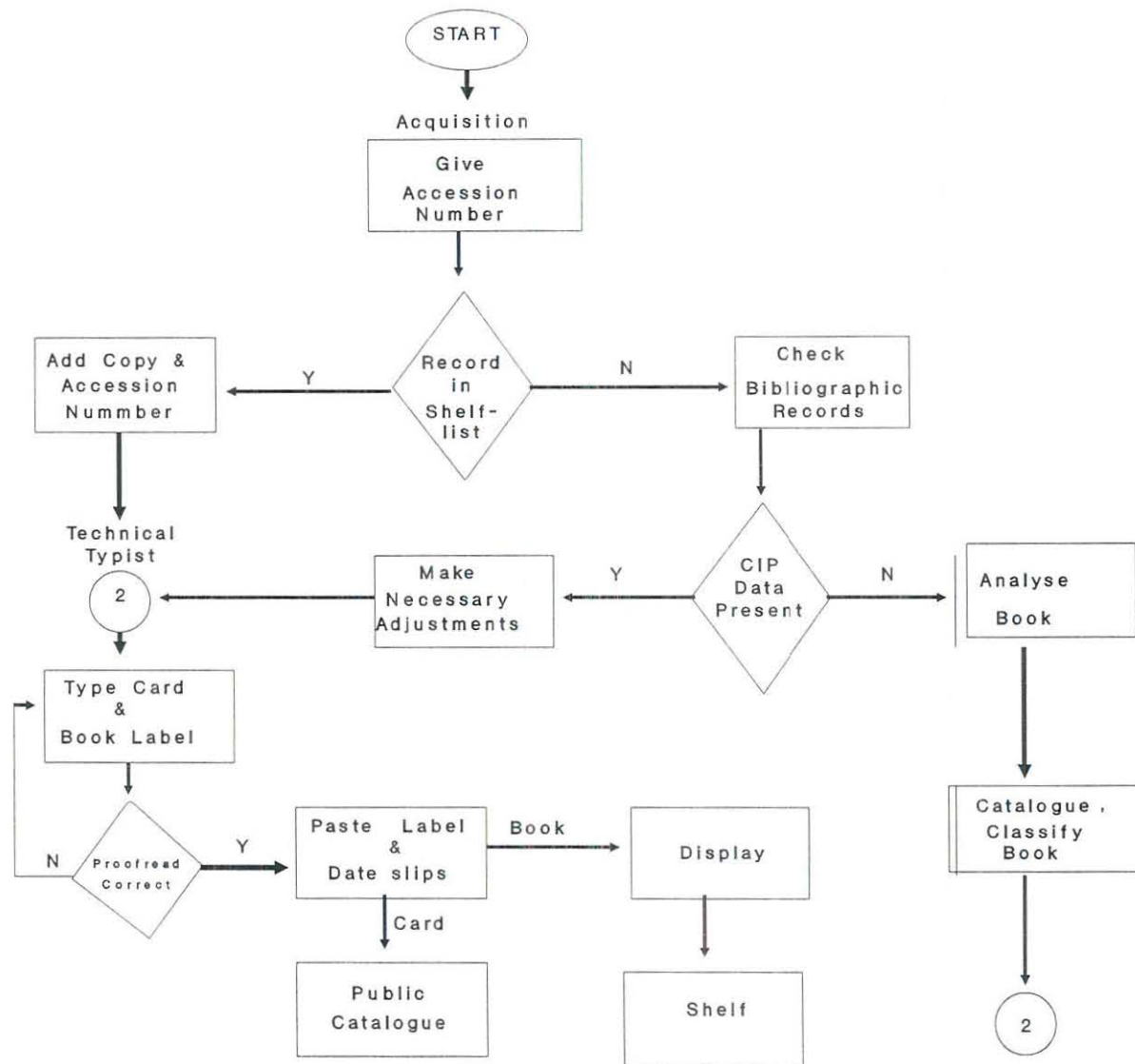


Figure 3.4 BOOK PROCESSING & CATALOGUE CARD PRODUCTION

3.4.1 Administration Office

This section deals with the management of the library staff and the overall operations in the library. This includes the Librarian's office and the secretary section.

Activities carried out in this section include:

- Preparing and administering the library budget;
- Selecting, training and supervising the staff;
- Participating in meetings of faculty and other university organisations, and hence, maintaining relations with university officials;
- Developing and supervising material collecting policies and procedures;
- Creating and administering library policies and regulations;
- Participating in the planning and equipping of new library facilities, and in the alteration of existing facilities; and,
- Maintaining personnel records and recommending promotions, transfers, salary adjustments and dismissals, if necessary.

3.4.2 Technical Services Section

This section consists of four subsections : the acquisition section; cataloguing section; technical typist section; and the bindery section.

3.4.2.1 Acquisition Section

The University library has a duty to provide all types of materials in all subject fields and the special collections relevant to the work of the university for the needs of both staff and students at all levels. The acquisition section is responsible for acquiring all these types of materials. The section is involved with selecting, bibliographic checking, ordering, receiving and accessioning of the library materials. The acquisition process of both books and serials is discussed in section 3.5.1.

3.4.2.2 Cataloguing Section

The Cataloguing section organizes and processes the library materials, in such a way that the users can easily locate the materials for effective use. In this section we have cataloguing and classification functions which deal with the identification and description of library materials. The cataloguing and classification processes are described in section 3.5.2.

3.4.2.3 Binding Section

The binding section is concerned with conservation and maintenance of the library collection, hence assure their availability for future generation of users. This section does only minor binding; otherwise, materials in need of major binding are taken to the EMC (Education Media Centre) for binding. When materials are brought to this section for maintenance, the staff prepares a list of documents, and the data fields include title, author, and the status of the book or periodical.

3.4.2.4 Technical Typist Section

This is concerned with the typing and printing of the catalogue cards and book labels.

3.4.3 **Readers Services**

The section disseminates the organised information materials to library users, and deals directly with the users. Within this section, there are three major sub-divisions: the reference, circulation, periodical, and the photocopy section.

3.4.3.1 Reference Section

This is the section that deals with the users directly especially as far as their search queries are concerned.

The reference collection contains a broad representation of major reference works, such as encyclopedias, language dictionaries, handbooks to subject fields, Almanacs and statistical compilations, language guides, bibliographical dictionaries, geographical atlases and maps, histories, research directories, calenders etc. This section also builds and maintains files of ephemera (newspaper clipping, pamphlets and photographs), which are indexed and filed by subject.

The major activities carried out in this section include:

- Registration of the users;

- Coordinating orientation and user education programmes for new users;
- Help on selection of reference materials by giving advice on orders for reference materials;
- Control and regulate the use of reference materials in the library;
- Receiving and dealing with the questions or queries of the patrons and giving appropriate information required by the patrons including referral services;
- Recording and indexing of all types of queries and referral services dealt with; and
- Interlibrary lending issues;

The users registration process is described in section 3.5.4.

3.4.3.2 **Circulation Section**

This is concerned with charging and discharging of library materials. Under this section we have the circulation desk which deals with long period loan, and the reserve desk dealing with short loan.

The functions at the circulation desk include:

- Charging and discharging of library materials;
- Recalling books from users, if required;
- Sending reminders to patrons who delay with books;
- Coordinating the clearance of leaving library patrons.

The charging and discharging system has been discussed in section 3.5.3.

The reserve section holds materials that are scarce yet in high demand by the users. These include books that are available only in one or two copies, but needed by a large number of users. Also available in this section are: past examination papers of the various courses offered at Egerton University; special pamphlets; and copies of personal books from the academic staff. These are put on reserve and lent on short term bases to ensure maximum utilisation by all users who need them.

3.4.3.3 **Periodical Section**

This section houses the periodicals like journals, pamphlets, magazines, development plans, etc. This section also houses the Africana collection.

Summary of materials held in the periodical section:

- African materials (all subjects);
- Research and technical reports;
- FAO and World Bank publications or materials;
- Thesis and Dissertation reports for Academic staff of the University;
- Pamphlets (materials of at least 40 pages and below).
- Annual Reports from ministries such as, Provincial, Districts and Institutions (like KARI) development plans;
- Journals and journal articles, both loose and bound;
- Magazines like, Newsweek, Time, Economic Review, Today's Marriage, Weekly Review, BBC Focus on Africa, Reader's Digest, Parents etc;
- Daily Newspapers - loose and bound (Kenya Times, Nation, Standard, Taifa-Leo and East African Chronicle);

- Chapters of the Laws of Kenya.

3.4.3.4 **Photocopy Section**

These services help stretch the library collection by offering photocopies at a reasonable charge. These services help users make use of information, especially from materials that cannot be taken out of the library, for instance materials in the reference and reserve collection. Users photocopy a few pages which they can refer to later at their own time.

3.4.4 **Archives and Audio Visual Section**

This section houses archives and audio visual materials like film tapes and microfilms and microfiche and microfiche readers, sets of photographs, audio cassettes, diskettes, copies of old documents pertinent to Egerton University including university calenders, catalogues, minutes of meetings and other reports.

3.5 **FUNCTIONAL PROCESSES**

This section describes the major processes that take place in the libraries. The acquisition and circulation processes have been briefly discussed to help determine the interrelationship between the proposed system and the rest of the operations in the library. The cataloguing process, the users' registration process, and the search process

at the reference section have been discussed since they have a direct influence on the proposed system.

3.5.1 Acquisition Process

The acquisition process could be triggered off by:

- The users who request for some materials;
- The publisher's list of the books on sale;
- Reading lists and bibliographies provided by faculty members; and/or
- The library identifying any gap in the subject coverage in the library collection.

From any of these, a list of recommended materials is compiled from which required materials could be selected.

Since most acquisition takes place in the Main library, when materials are received in the Main library's acquisition section, those that are supposed to go to branch libraries are transferred to the respective libraries. Materials for the Main library and for departmental libraries are given the library ownership stamp and accession number, after which they are passed on to the cataloguing section for further processing.

The data fields in the acquisition process include : Author, title, edition statement, date of publication, publisher, price, ISBN, ISSN, supplier, illustrations, paper or hard back, date of order, and date of receipt.

Serials Acquisition

The selection and processing of periodicals follow the same process as those of books. As the periodical issues are received, they are indexed by subject, and details entered into the kardex which is filed alphabetically by title. After all the issues of a given periodical have been received, they are bound together then cataloguing and classification of the periodical is done. The cards are filed in the periodical card catalogue alphabetically by class number.

The data fields in the serial's file include subscription fee or price, donations, publisher, month or year of publication, volume number, issue number, date, frequency and the supplier's address, invoice number and date of invoice.

3.5.2 Cataloguing Process

This section describes the process through which a newly acquired book goes through, until it is shelved on the shelf. It also describes the process of generating catalogue cards. The process has also been summarised in a flow chart in Figure 3.4.

Once a newly acquired book is in cataloguing section, the following actions are taken:

- The master catalogue or shelf list is checked to ascertain whether there is already a copy of the same book in the library or not.

- If a copy is found, the card is pulled out and a few adjustments are made, for instance, adding the copy number and the accession number.
- The book is then taken to the technical typist who types labels meant to identify the book. Red label is given for reference materials and yellow label for other materials.
- The book is then taken to the bindery section where the book label, the date due slips, and the call number are pasted on the book. Date due slip includes the date of issue, date of return and very brief rules regarding the loan period and renewals.
- The processed books are then taken to the recent acquisitions display section for two weeks, before they are taken to their respective book stacks for shelving, from where the users can use them. On the shelves, the books are arranged by call number.
- If the book is the first copy to be received in the library, hence there is no record in the master file, it is checked whether or not it has the cataloguing-In-Publication (CIP) data.
- If the book has the CIP data, the cataloguer edits the number and prepares a card making any subject and added entry changes or cutter number if necessary, and then adds the copy number of the book. The main entry and added entries are verified to ensure consistency in the form of

heading. The number of catalogue cards to be printed is then assigned, depending on the number of the added entries.

- After this, the book and its cards are sent to the technical typist section. Here, the book labels and the catalogue cards are typed accordingly.
- However, if the book does not have CIP data, then original cataloguing is done. In cataloguing, both for descriptive and subject cataloguing, the AACR2 rules are followed. Descriptive cataloguing is done giving the physical description of the item. In subject cataloguing, subject analysis is done to identify the major subject matter of each book for representation in the catalogue. To ensure consistency in subject terminologies, selection of Subject Heading is done using the Library of Congress Subject Heading list.
- The book is then classified and given a class number according to the Library of Congress rules of classification, using the Library of Congress Classification schedules and subject headings list. The Cutter numbers are given according to the Cutter tables.
- After the materials are catalogued and classified, a single card is prepared indicating how many cards are to be typed to accommodate added entries. The added entries could be prepared from the co-authors if more than one is responsible for the work, corporate body or subject heading. Each book

may be represented by one or more subject headings, each consisting of a term or group of terms representing a subject.

- Then they are taken to the technical typist. The typist types the card for the main entry and duplication is done using a minigraph machine to accommodate the added entries.
- The cards are then verified and if approved, they are placed in the book which is then taken to the bindery for the labels and date due slips to be pasted.
- When the book is ready, it is taken for display and the catalogue cards are taken for filing. Cards are sorted out and filed on the catalogue cabinet alphabetically by author and/or title, and the added subject entries are filed by subject in the subject catalogue. One card is filed in the master catalogue.

Until mid 1960s the classification system used in the main library was Dewey Decimal classification. From early 1972, the Library's classification system changed to Library of Congress. The library uses the Anglo-American Cataloguing Rules 2nd edition (AACR2). The libraries use AACR2, second level of description.

However, in Kisii campus library, the same procedure is used to process the books, though the information materials are classified using the Dewey Decimal classification.

Conversation with Mr. Leonard of Kisii library revealed that, now that the library is a branch of Egerton university library, the library will start using Library of Congress classification scheme soon, to ensure consistency with the Main and the other Egerton libraries. The problems faced by the staff in the process of manual cataloguing are discussed in Chapter 5.

3.5.3 Charging and Discharging System

3.5.3.1 Duplicate Slip System

In the Main library, FASS and Laikipia libraries, the charging and discharging system used is the duplicate slip system. In this case the borrower is given a slip to fill the details of the book. These slips are filed and are cancelled when the book is returned. The data elements in the borrowing slip are author, title and class number of the book, borrower's last name and initials, the ID number, department/hall of residence, and borrowers' signature.

3.5.3.2 Browne System

In Kisii Campus library, the Browne system is used in charging and discharging materials. During processing, each book is equipped with a card which contains the author, title and class number of the book. Users on registering, are given a number of small pockets (tickets) bearing the name of the user, address, and date of expiry of the ticket. Users surrender a pocket for each book borrowed.

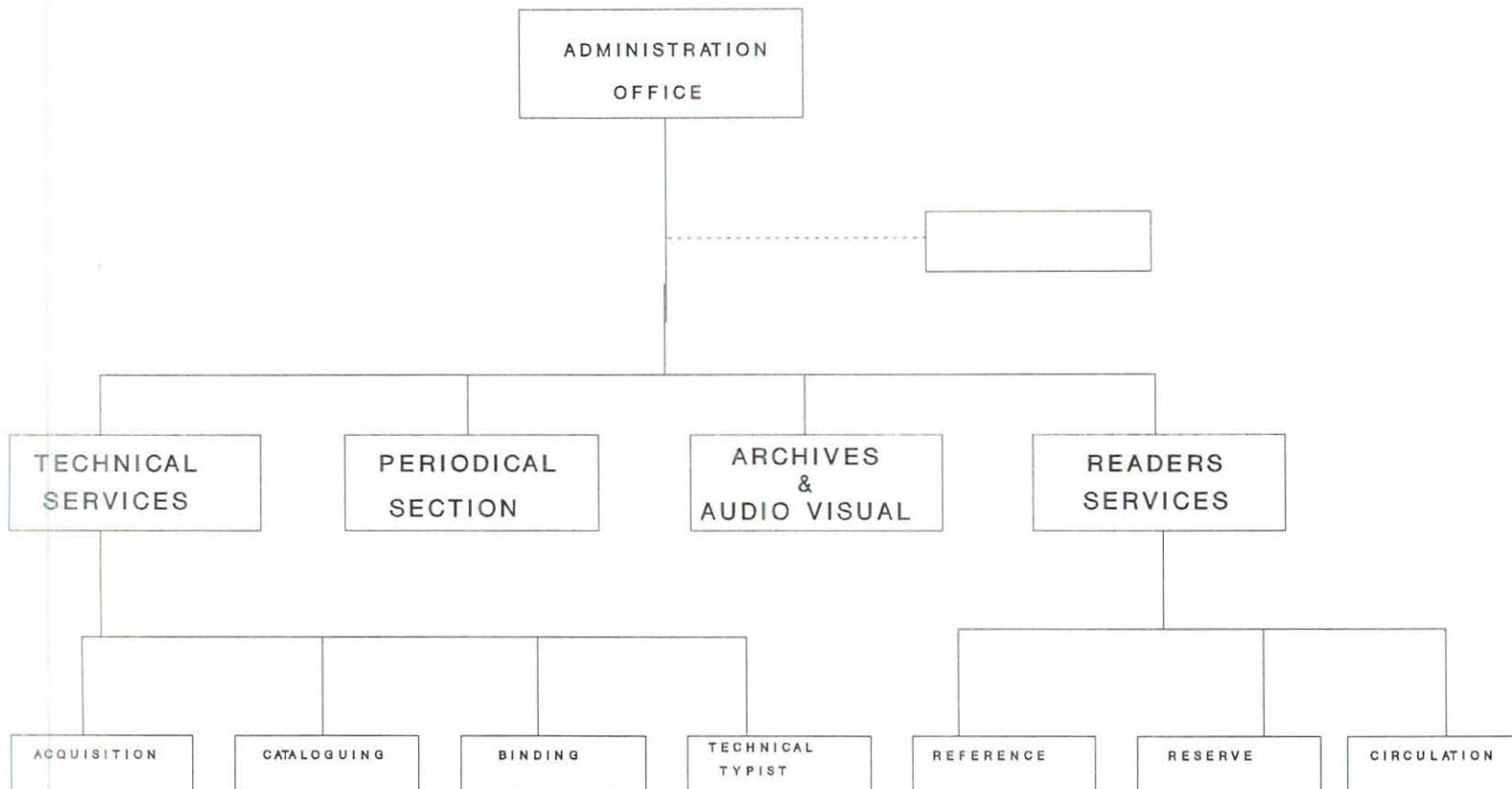


Figure 3.3 FUNCTIONAL ORGANIZATION OF THE LIBRARY SYSTEM

The major files kept in the circulation section include;

- monthly issue and receipt statistics;
- Reservations file;
- Notices and/or reminders file; and
- Fines file;

3.5.4 Registration of Users Process

In registration, the users are given a membership application card to fill. The main data fields on this card include: Name of the user, ID number, Address (department, for staff or hall of residence, for students), status (staff or student), faculty, date, Dean's signature and the user's signature. The faculty Dean's signature is required to prove that the student or staff is a valid member of the faculty. After the cards are duly completed, they are returned to the library where they are filed alphabetically by surname. In Kisii library, users on registration are given borrowers pockets which they use when borrowing library materials.

3.5.5 Search Process at the Reference Section

The reference section is a section that deals directly with users as far as their search queries are concerned. The users approach the reference librarian with various search queries. They are expected to consult other sources of information and if not successful, then consult the reference librarian. In the reference section, the librarian gives them an enquiry form to fill indicating as precisely as possible their search subject,

topic and if possible the keywords. This is to enable the librarian retrieve the most relevant information easily. A sample of an enquiry form has been given in Figure 3.5.

After completing this form, the users leave them with the librarian and check on the results at a later date. According to the reference staff, search queries range mostly between 20 to 40 and sometimes more in a day.

Though the reference staff try their best to cope up with the users' search queries, there are some problems faced by the library users as well as the reference staff. These problems have been discussed in Chapter Five.

<u>EGERTON UNIVERSITY LIBRARY</u> <u>INFORMATION INQUIRIES FORM</u>	
1. Name: _____	Date _____
2. Category of Users : (Please tick where appropriate)	
a) Diploma : _____	
b) Undergraduate : _____	
c) Postgraduate : _____	
d) Teaching staff: _____ Dept _____	
Non-Teaching staff _____ Dept _____	
3. Subject Area : _____	
Keywords of the information being sought by the user : _____	
4. Purpose for which information is sought :	
Essay _____ Seminar Paper _____ Research _____	
Term Paper _____ Others (specify) _____	
5. Have you consulted or used any information materials in the library before the inquiry?	
If yes which ones?	
i) Public catalogue (author/title and subject) _____	
ii) Books _____	
iii) Periodicals _____	
iv) Bibliographies _____	
v) Others _____	
6. Latest date when the information is required: _____	
<u>FOR OFFICIAL USE ONLY</u>	
a) Problems encountered : _____	
b) Suggestions: _____	

Name : _____	
Date : _____	Signature _____

Figure 3.5 A Sample of the Forms Used at the Reference Desk.

The catalogue cards, which are 3x5 inch in size, contain bibliographic information of the library materials. The cards are filed in a catalogue cabinet. Internal guiding to the cards is achieved by inserting guide cards with tabs which protrude above the catalogue entries. External guiding is achieved by labelling the outside of each drawer with either one or two letters. There are rods that lock the cards in place, and prevent unauthorised removal of entries. These rods are released when staff wants to insert new cards.

The Library System uses a divided catalogue system. The catalogue is divided into two parts, an author/title catalogue, and a subject catalogue. The author/title catalogue includes personal and corporate authors, series and selected titles, all arranged in alphabetical sequence. The subject catalogue is an alphabetical listing of books under subject. The main catalogue contains records of book materials. There is a card catalogue in the periodical section containing records of serials and technical and reports. This catalogue is arranged by call number. The reserve section also maintains a sub-catalogue for the reserve collection. This too is arranged by call number.

There is a master catalogue (shelflist), where all the cards are filed by call number. The shelflist is located in the cataloguing section and it acts as an authority file, which the cataloguing staff regularly consult, to ensure that book numbers are not duplicated. It also guides classifiers in selecting the category that is most appropriate for each book. The shelf list is also consulted before any books are ordered to ensure that no books are ordered if already owned by the library. Its arrangement reflects the order

in which the books are arranged on the shelf. It is therefore very useful for inventory purposes.

All the cards in the mentioned catalogues are either typed or handwritten, in English language. The catalogue card has the following data fields : Author, Title, Edition statement, statement of responsibility relating to edition statement, place of publication, publisher, Date of publication, collation, series statement if available, Bibliography, notes, ISBN, Tracings, class number, Accession number and price.

However, out of all these fields, the main access points are the Author, Title, and Subject. These are very limited access points. Users cannot, for instance search and retrieve information by using the title keywords, or other parameters. There are several problems faced by users as well as the library staff while using this catalogue. These problems have been discussed in Chapter Five.

3.7 FUTURE PLAN OF THE LIBRARY SYSTEM

All the sections discussed in section 3.5 and their operations, are not computerised yet. The expansion of the University and the increase in the population, both students and staff, has consequently led to the increase of the library users as well as the library materials, and consequently, increase of library use. This has led to:

- Increased pressure on the scarce library services and resources particularly books of textbook level ;

- Increased pressure on the staff resources, who have to handle more materials and deal with more users every day;
- Loss of books;
- Book mutilation, rising tear and wear of the materials including the card catalogue; and,
- Shortage of space for library staff and users.

These problems have made attainment of the library's objectives very difficult. A modern university library ought to be conceived as an information system, where use of information for teaching and research and generation of new information are the main goals. "A purposely built university library must meet the stated purposes, objectives and programmes of the university. In order to do this, the library should bring together its various materials, financial and technical resources and coordinate them effectively" (Egerton University Library Development Plan 1994-2004). The increased demand for services and consequently increased library workload, must be counterbalanced with improved productivity, especially with the present scarce economic resources, which has led to either static or declining budget resources.

This can be achieved through the introduction of a computer-based system. The Egerton University Library projected expansion is based on this understanding. The library plans general expansion of the library services, and intends to computerise its operations in the near future.

The library also plans to use other available and relevant IT, including electronic data processing and telecommunication system (Fax and E-Mail). Interlibrary cooperation is also to be encouraged in relation to:

- a) collection development;
- b) Resource sharing; and,
- c) Development of a union catalogue

The projected status of the University's library is 15-20,000 users with books and bound periodicals consisting of 1.7 million volumes by the year 2004. These materials are to be contained in various libraries as shown below (Egerton University Library Development Plan 1994-2004).

Science and Technology Library	30,000 vols.
Education & Human Resource Library	30,000 vols.
Faculty of Arts & Social Sciences Library	30,000 vols.
Agriculture Library	30,000 vols.
Utafiti library	30,000 vols.
Main Library	1400,000 vols.
Constituent library	150,000 vols.
Total	1700,000 vols.
Periodicals	5,000 titles

CHAPTER FOUR

ONLINE PUBLIC ACCESS CATALOGUE (OPAC): An Overview

4.0. INTRODUCTION

This chapter provides information about the OPAC system: its history and development; its components; desired features of OPAC; and a few OPAC modules provided by some Library Management Systems. This information was obtained from literature review of various documents as mentioned in each section.

4.1 LIBRARY AUTOMATION AND DEVELOPMENT OF COMPUTER-BASED CATALOGUES

The origin of computers, go way back to Leibnitz's idea for a calculating machine and Hollerith's idea of punch cards, in the 1880s. The use of computer for information management started with Hollerith's punch cards that were used in 1880 for the US census. During World War II, computers were used secretly for cryptography, a development that led to wide realisation of the potential of computers (Knapp 1983).

A major break through took place in the mid 1960s, when online access to information as an identifiable part of the work of documentalists, librarians and information scientists started (Mahon 1982). In the early 1960s, producers of secondary

information services (abstracting and indexing services), began to use computer assisted methods to produce their products more rapidly. This led to the availability of machine-readable version of the printed index, which could be mounted on the computer and accessed remotely by users using specially developed retrieval programs (Knapp 1983). These computer-assisted typesetting, led to the development of online databases of today.

Initially, the online services were operational in batch mode and users had to wait for some time after submitting their search request, before getting results. With the development of and efficiency in operating systems software, high speed random access storage devices (discs), and use of data communications facilities linked to computers, multitasking by relatively small computer systems became possible. By mid 1960s, many users could be supported remotely from the computer site (Mahon 1982).

Computer-based cataloguing and circulation systems appeared in the 1970s, developed by cataloguing co-operatives and networks between academic or public libraries, such as BLCMP (Birmingham Library Cooperative MARC Project), SWALCAP (South West Automated Library Cataloguing Project), and LASER (Library Automation South East Region) in UK (Hancock-Beaulieu and Mitev 1989).

Most of the computer-based cataloguing systems developed in the 1960s and 1970s, relied on the actual catalogue being prepared on some physical medium such as catalogue cards, COM film, COM fiche or computer printed bookform. However, during the 1980s, many library management systems began to include modules for the public

to gain access to the catalogue. This led to development of online public access catalogues (OPACs).

4.1.1 Need for OPAC

Today, OPACs are needed more than ever before. The accumulation of information over the years has reached a proportion that its storage and retrieval in response to users's queries can not be efficiently and effectively handled by manual methods. Libraries have therefore realised that the data ordering and high-volume processing capabilities of computers are appropriate in managing the cumbersome indexes and catalogues (Culkin 1989).

In addition, the learning behaviour of many people has changed. People now prefer visual and/or aural communication of information. They also want simple and straightforward access; results to be presented in attractive, easily understood display; and no physical inconvenience (Culkin 1989).

Initially, economic and conversion issues prevented adoption of computer technologies, until the revision of the AACR which dictated that manual catalogues be refiled to comply with the revised rules. In addition to this difficult task, there was no guarantee that later revisions will not require similar efforts in future decades. Due to this, information managers decided that time for computer-based catalogues had come (Culkin 1989).

Therefore, bibliographic control is in a state of transmission in most academic libraries, as most of them are implementing online systems and rapidly moving from the card catalogue to the online catalogues. "Various libraries are currently on various stages on the continuum, from a manual system of bibliographic control to one which is totally online" (Bengtson 1984).

Apart from the factors mentioned above, developments of the online catalogues has been enhanced even more by various advantages associated with these catalogues over the manual catalogues. Mathews (1986), Thesing (1983), Culkin (1989), Fayen (1983), Kimber (1974), Hartley et al. (1990), Weibel et al (1989) and Markey (1983), have listed a number of advantages, including the following:

- Catalogue maintenance including introduction of new records, deleting of records or entries, as well as changing the records is more efficient and less expensive;
- Ability to consult multiple indexes and quickly assemble and sort results, improve searching for the end-users;
- Online catalogues can be consulted from locations outside the library, thus offering users access to the library's holdings from remote sites. Therefore, time normally spent walking to the library is saved, and especially so, if the search does not yield any fruitful results;
- When using the online catalogue, items in the catalogue do not have to be filed according to any filing rules;

- Online catalogues offer rapid search capabilities especially for complex searches;
- The ability to offer access points not available in print forms is very valuable for specialised queries;
- When using the online catalogue, the users's persistence will almost always produce some useful data given a database of reasonable size, while the larger the card catalogue the more difficult it is for the naive user to find any useful information;
- Through interaction with the computer, online search strategies can be modified at the terminal if necessary, to retrieve more relevant output;
- Using the online catalogue, more precise search output can be gained since the computer can qualify or limit search results in many ways. Searches can be limited to citations in specific languages, qualified by date of publication, or even by type of document;
- In an integrated environment, citations for items on order or being processed are available much earlier than if the manual card catalogue was in use. It is also possible to determine whether a book is in the collection of a particular library, and whether it is available or on loan;
- The computer environment allows collections from multiple institutions or branches of one institution, to be viewed in an amalgamated environment.

- Automated cataloguing increase the productivity of cataloguers and allow economic building of document collections with minimum human cataloguing effort.

4.2 MAJOR COMPONENTS OF AN OPAC SYSTEM

An online public access catalogue (OPAC), can be defined as a mechanism that provides library users (Public) with real-time interactive (Online) access to the bibliographic records for the library's holdings (Catalogue). The online catalogue enables users to search bibliographic records in various ways which need not be stipulated during database creation, but which may be constructed by the user to meet a particular information need at the time the search is conducted (Fayen 1983).

Literature review of various sources of information including: Lawrence, Mathews and Miller (1983); Culkin (1989); and Mathews (1985); reveal that an OPAC has various components. The components can be grouped into five major parts as follows:

4.2.1 Database

The database consists of the library's holdings. In most cases this consists of bibliographic records. However, in some systems OPACs offer access to other records like: business records for acquisition subsystems; information and referral records for community services and reference materials, for instance, Grolier's Academic Encyclopedia at Carnegie Mellon University, Arizona State University and Colorado

Alliance of Research Libraries (CARL); Career services data at Arizona State University; and, Journal and document indexes, for instance the Colorado Alliance of Research Libraries (CARL) offer online access to the contents of current Journals through its own database called unCover. The database consists of table of contents collected from Journals owned by its members (Culkin 1989).

4.2.2 Computer System

This consists of various aspects including hardware, terminals, and software, as discussed in the following sub-sections.

4.2.2.1 Hardware

Hardware consists of: the Central processor (CPU), often referred to as the computer; direct access storage devices (disk and drum); mass storage devices like tapes; and peripheral equipments like printers for printing the search output.

The CPU is the key component of the computer system. It coordinates the computer by directing and controlling streams of electrical impulses (bits), within the CPU itself as well as those that travel to and from the CRT terminals, and to and from the disk drives (Mathews 1985).

4.2.2.2 **Terminals**

Terminals are required both for staff and for public access. A terminal is used by patrons to transmit the patron's search request to the computer and to receive and display information back to the patron. The types of terminals mostly used are the standard or modified CRT terminal with a keyboard that resembles a typewriter, and a touch screen terminal with no keyboard (Mathews 1985).

4.2.2.3 **Software**

Software are programs for controlling and operating the computer. This also includes the user interface.

User Interface

The User interface, acts both as a link between users and the retrieval capabilities and the database, as well as a barrier protecting the user from all other aspects of the computer system. The interface is concerned with provision for entering search commands and controlling the search process, provision for formatting and controlling displays, provision for online assistance, and provision for specific features.

4.2.3 **Users**

The users are the authorised members of the library, who are commonly referred to as the Public to whom the system is targeted.

4.2.4 Telecommunication system

It consists of communication lines: direct lines, leased or dial up telephone line, cables, and microwave; signal processing equipments like modems, multiplexer; and specialised communication software etc. The telecommunication system connects elements of computer system with other computers. It also links the user to the database, and to the other aspects of the online catalogue system. This provides access either through direct, leased or dial up telephone line (Lawrence, Mathews and Miller 1983).

4.3 DEVELOPMENT OF OPACs

Since OPACs started developing in the 1970s, there have been major developments (Tedd 1993; Hancock-Beaulieu and Mitev 1989; Mitev, Venner and Walker 1985, Hildreth 1989). Therefore, OPACs may now be categorised into three generations, as briefly explained in the following sub-sections.

4.3.1 First Generation OPACs

First Generation OPACs appeared in the 1970s, and were derived from the cataloguing or circulation systems. These OPACs were library oriented since they were primarily designed for the library staff and cataloguers as a book finding and locating tool. They are therefore good for known item searching and hence they are commonly referred to as phrase-indexed or pre coordinate OPACs (Mitev, Venner and Walker

1985). Due to their library staff oriented background, they are quite limited in terms of retrieval and interface facilities for the public.

According to Hancock-Beaulieu and Nathalie Mitev (1989), their retrieval features were commonly:

- acronym searching, with acronym keys being constructed from a small number of characters from different fields. An acronym key of eight characters could be constructed from, the first four characters of the author's name, and the second four from the first four characters of the title.
- phrase searching, whereby the user could search using known title, author or class mark as phrases.

These retrieval features were mainly menu driven. The features were almost identical to the previous manually searched COM or card catalogue, which could also provide for browsing through alphabetical title entries. The advantages of these first generation OPACs include:

- Menu-driven interface, which provide simple retrieval features, which were easy to understand and use especially to novice users;
- If the searcher knows what he/she is looking for, for instance, the exact author name or title, then the search output are very precise and does not retrieve many unrelated items; and,

- Records are usually displayed on the screen terminal as a result of a search. Even if an exact match of the search term is not found, then records nearest to the search key are displayed and the user can scan the alphabetically neighbouring entries and automatically adjust the search term, if necessary.

Though simple to use, these OPACs had some disadvantages including:

- They expect exact match of the search term on a particular field; hence they are intolerant of the users' mistakes;
- Since they were almost a replica of the manual catalogues, access points were limited hence; they did not improve the quality of searching;
- They were mainly targeted for the novice users hence were quite boring for expert users.

4.3.2 Second Generation OPACs

The second generation OPACs came up in the 1980s, and were derived from the commercial bibliographic information retrieval systems of the 1970s (Mitev, Venner and Walker 1985). Therefore, their information retrieval characteristics are based on the information retrieval techniques developed by well established online search services like DIALOG (Tedd 1993).

These OPACs have combined the library oriented approach of the first generation OPACs and the online bibliographic system oriented approach. In fact, Charles Hildreth

(1989), said, "Today's second generation online catalogues represent a marriage of the library catalogue and conventional online information retrieval systems.... Improved card catalogue-like main entry searching and browsing-by-heading capabilities have been joined with the conventional IR keyword and boolean searching approaches" (Hildreth 1989).

These OPACs allow users to search the databases from various fields. They allow word searching capabilities, and hence, they are often referred to as post-coordinate OPACs. The access points could be words from titles, subject headings, authors or other names. Subject searching is supported by a variety of exact match query methods and browsing facilities. Search statements may also be compiled by linking search terms using boolean operators. The search history is also presented at every stage.

Most of the second generation OPACs have two levels of user-interaction; a simple one for inexperienced, or novice searchers; and a more advanced one for more experienced searchers (Tedd 1993). They provide both menu-driven and command-driven features and some of them operate by command languages, which may be simplified for use by novice users.

Though these OPACs are said to be better than the first generation OPACs, research studies on online catalogue have uncovered a number of problems experienced by the users including the following:

- Only one or two terms in each search statement can be used;

- Due to the large and wide subject coverage, sometimes search attempts retrieve too many hits or false drops;
- In systems that use boolean operators, sometimes searches retrieve no matches because boolean systems only retrieve items which match the query exactly;
- There is lack of detailed content representation in the records;
- Often the users are not familiar with the subject indexing policy, hence often use search terms that do not match the system's subject vocabulary;
- It is difficult to browse through the records, for instance, they do not support browsing in display of classification outlines or schedules;
- There is often navigational confusion and frustration for the user during the search process; and
- There is often misunderstanding and confusion about the fundamentally different approaches to search and retrieval methods employed, for instance, pre-coordinate phrase searching and browsing, and post-coordinate keyword/boolean searching (Hildreth 1989).

4.3.3 Third Generation OPACs

Due to the draw backs of first and second generation, third generation OPACs have now started appearing (Tedd 1993). These came up in the 1990s. Lucy Tedd continues to say that, these OPACs have various characteristics including:

- Non-boolean retrieval techniques. This characteristic was also supported by Hancock-Beaulieu and Nathalie Mitev (1989), when they said that, the second generation conventional boolean retrieval is "appropriate for experienced intermediaries and dedicated users searching databases of

limited and specialised coverage, but is questionable in other contexts".

They therefore talk of going beyond boolean in the next generation (Hancock-Beaulieu and Mitev 1989).

- Enhanced record contents, achieved by including additional controlled and uncontrolled access points like chapter titles in books;
- Acceptance of search expressions in ordinary language with facilities for using dictionary to provide abbreviations, synonyms or spelling variants;
- Provision of context-sensitive automatic help;
- Displaying the search output in order, giving the most relevant records retrieved first.
- Using terms from relevant records retrieved from previous search of ranked output.

Though these features have been said to be third generation OPAC features, some of the OPACs provided these features as early as 1980s. For instance, the National Library of Medicine's CITE public access catalogue, allowed users to enter subject queries in plain English. A user could for instance, put his search query like, "community health services for the elderly and handicapped" (Hunter and Bakewell 1993)

Various systems have also made attempts to improve their OPACs facilities and today, there are systems offering graphical user interfaces for instance, Dynix online catalogue.

4.4 DESIRED FEATURES OF AN OPAC

Due to the modern intra-organisational communications networks in both the commercial and academic environments, OPACs can be searched by users from a distance without visiting the library. This means that it is not possible to provide each and every user with written and printed help documents on how to perform the searches (Hartley et al.1990). Hartley and others continue to say that, OPAC users have a wide variation among themselves in terms of their

- a) competence in computer use;
- b) knowledge of catalogue and cataloguing;
- c) knowledge of information retrieval; and
- d) knowledge of the subject on which they are seeking information.

Therefore, an OPAC need to be intelligible and user-friendly enough to be accepted by the different kinds of users. In attempt to make OPACs as user-friendly as possible, different approaches have been adopted by different information system. However, according to Tedd (1993), Tague (1989), Culkin (1983), Hancock-Beaulieu (1992), as well as Fayen (1983) who listed a number of the desired online catalogue features that were developed by CONDOC (Consortium to Develop an Online Catalog) with the assistance of Joseph R. Mathews in 1980, there are a number of desired basic

features that an online catalogue should have. Enumerated herewith are some of the desired features of an online catalogue.

4.4.1 Database Features

- The database should contain MARC records for monographs, serials as well as other classes of materials;
- The system should be able to maintain authority file information; and
- The system should support authority file for names and subject heading with appropriate cross-references;

4.4.2 Output Features

- The system should be able to provide different display formats, for instance, both brief and detailed display of the retrieved records and various indexes;
- When the retrieved output is displayed, the system should show the total number of items retrieved;
- The system must provide some flexibility in the arrangement of citation information for instance, the retrieved records should be able to be sorted in different ways;

- The system should provide printing facilities for users to be able to get a print-out of the search results, if necessary. At minimum, the user should be able to print at least a few lines to enable him/her pick the documents from the shelves.
- The system should be able to differentiate between best and partial matches so that the output is displayed in ranked order, with items matching the query best appearing first.
- The system should provide fast response.
- The system should provide some flexibility with respect to which portions of MARC record are included and which fields are searchable.

4.4.3 Search Features

- The user should be able to search the database using various access points including: the author; title; and subject keyword, at minimum. However, the edition statement, publisher, year of publication, language of the item, ISSN, ISBN, LC card number are also necessary search access points;
- The bibliographic citation must contain copy location information;
- The system should provide keyword access to title and subject headings;
- The system should provide boolean operators like AND or OR for search refinement by either limiting or expanding search results;

4.4.5 Interface Features

- The interface should be easy to learn and use with limited support from printed materials;
- The system should give both menu driven and command-driven approaches and give the user an option to choose between the two;
- It should be possible to add, change or remove some interface features, for instance, modify the way a user enters a search, without changing the basic structure of the online catalogue system;
- The online catalogue should have a system interface with other components of an integrated library system, for instance, the acquisition section, to provide on order information, and the circulation section, so that patrons can get location and status information;
- If the catalogue is considered primarily for public access, an alternative interface for library staff should be provided to cater for housekeeping functions;
- The interface should be in such a way that there is two-way communication or dialogue between the users and the system;
- The system should have an online link to a bibliographic utility, for searching and displaying output.

4.4.6 Screen Features

- The first screen of a new session should identify the library or system. It should be clear and inviting to both the novice and experienced users;
- The screens should indicate where the user is at every stage;
- The search output screen should indicate the number of records retrieved.

4.5 DIFFERENT TYPES OF OPAC MODULES AND THEIR FEATURES AS OFFERED BY SOME LIBRARY MANAGEMENT SOFTWARE PACKAGES

Though the features described in section 4.4 are all desirable features, developing most of these features adds to the cost of developing, maintaining and using an OPAC system (Tague 1989). Therefore, different systems have developed OPACs adopting the desirable features according to their specific situations and needs.

We shall briefly look at a few of the existing OPAC modules offered by some of the library systems, implemented in some University libraries, to see which of these desired features have been adopted. However, it should be noted that most online catalogues are constantly being changed and modified. Therefore, the features given here of these OPACs are just to give us an idea of the online facilities. Otherwise, the actual

features might have been modified by now, hence the operating versions might look different.

4.5.1 OPAC Modules

The online catalogue systems considered are: CARL, CAS, CITE, DYNIX, GEAC, LIAS, LIBERTAS, MELVYL, TINlib, ULISIS, and BLCMP. After a brief introduction of each of these systems, their features are presented in Tables 4.1-4.5. Sample screens (Figures 4.1-4.3) have also been given to depict a picture of the online screens. The major sources of information consulted are: Mathews (1985); Rowley (1993); Hunter and Bakewell (1993); Fayen (1983) and Tedd (1993).

4.5.1.1 CARL (Colorado Alliance of Research Libraries)

The Colorado Alliance of Research Libraries (CARL), began in 1974 as a consortium of the larger research libraries in Colorado. The first system designed was an OPAC which was soon followed by a circulation module (Tedd 1993). This system was developed by Ward Shaw and Patricia Culkin, to provide a circulation control and online catalogue to six academic libraries and one public library, including: Aureria, Colorado School of Mines, Denver Public library, University of Colorado, Boulder, University of Denver, and University of Northern Colorado (Mathews 1985). Today, it serves many other libraries. Currently CARL system provides all the usual modules of an integrated library management system, and has a special system, UnCover, for periodicals. It plans to develop a graphical user interface (GUI) to its public access catalogue (Tedd 1993).

4.5.1.2 CAS (Catalogue Access System)

This Online Union catalogue was developed by the Minnesota State University in 1976. It is now available in eight Minnesota locations including, St.Cloud State University and Moorhead State University.

4.5.1.3 CITE (Computerised Information Transfer in English)

CITE was developed by Tamas Doszkocs at the National Library of Medicine(NLM), as a prototype online catalogue for end users. The National Library of Medicine (NLM) initiated MEDLINE, the world's first national remote access online information retrieval system, in 1971 (Doszkocs 1983). In 1979, the NLM implemented the CITE prototype end user interface for its MEDLINE medical Journal citation database. Doszkocs continues to say that, CITE's functional features include the following:

- Natural language query input;
- Automatic stemming of search terms;
- Automatic Query term weighting;
- Displaying suggested terms;
- Processing term lists and displaying retrieved records;
- Dynamic user relevance feedback; and
- Utility of closest match search strategy for known items.

4.5.1.4 DYNIX

Dynix was developed in the early 1980s in the US. The OPAC module is a part of a fully integrated library system. It supports analytic indexing and retrieval, and permits patrons to reserve materials (Mathews 1985). Dynix is used in many libraries today. State Library of Victoria implemented Dynix in 1987, and one of the reasons for choosing Dynix was its good OPAC user interface (Tedd 1993). Dynix now offers a Graphical User Interface (GUI), which provides users with access to the library's information from their desktops. The GUI has drop down menus, and mice to point-and-click (News from Dynix 1994). The other features have been given in Tables 4.1-4.5.

4.5.1.5 GEAC

Geac system markets an online library information system developed in conjunction with the University of Guelph (Guelph Ontario). GEAC system started as a circulation system developed in 1977, which later grew to include acquisition, and an OPAC module which became operational in 1984 (Fayen 1983).

Today, the Geac computer limited offers two library management systems: GLIS, the Geac Library Information System, which runs on Geac's own proprietary hardware and operating system; and Geac Advance, which is an integrated system that conforms to open systems standards, and runs in PICK environment under UNIX (Rowley 1993). GLIS is installed in many university libraries and has a multilingual user interface of up to 8 languages.

4.5.1.6 LIAS

The Library Information Access System, was developed at the Pennsylvania State University Libraries in 1975. Apart from the Online catalogue access which was made available to the public in 1983, LIAS has other components like the circulation, the bibliographic control and the acquisition systems (Mathews 1985).

4.5.1.7 LIBERTAS

LIBERTAS was launched in 1986 in UK, and implemented at the then Polytechnic of Central London. LIBERTAS is a fully integrated computer system, well known amongst the larger academic and research institutions in UK for its advanced and comprehensive functionality (Program 26(4):412-413). The catalogue records use the MARC format. These records can be retrieved from the Central SLS database in Bristol, which contains about two million shared records. LIBERTAS can be used in up to nine languages, and supports different national character sets and filing rules. The menus and commands are available in the various languages including, French, German, English, Italian, Spanish, and Welsh (Tedd 1993). Example of institutions using LIBERTAS are Gothenburg City Library, which was the first public library to implement LIBERTAS, University College of Wales Aberystwyth, and Malmo City Library in Sweden (Program 26(4): 412-413).

4.5.1.8 **MELVYL**

This was the University of California Prototype Online Union Catalogue, which was developed in accordance with, "The University of California Libraries : Plan for Development", published in 1977. MELVYL was developed in 1980, and the University of California MELVYL online catalogue was implemented in 1981 (Mathews 1985). By the 1990s, MELVYL had expanded to provide, via the same interface as the catalogue, several abstract and indexing databases such as MEDLINE, current contents, and some Information Access databases (Tedd 1993).

4.5.1.9 **TINlib**

TINlib is an integrated library management system supplied by IME (Information Made Easy). TINlib has been widely implemented in academic, special and public libraries (Larsen 1992). This software has powerful search facilities. Its query by form template is ideal for doing complex searches as it allows the user to enter and combine search terms.

The Information Navigator, TIN, of this software provides navigation facilities which provides further information on a particular item. For instance, by pressing carriage return on an individual author the user is presented with a list of all other materials in the catalogue by the same author (Chappell et al. 1992). The software is available in several languages (up to 14) and is able to handle different character sets.

Table 4.1

DATABASE FEATURES

	ONLINE CATALOGUE SYSTEM									
FEATURES	CARL	CAS	CITE	DYNIX	GEAC	LIAS	LIBERTAS	MEL VYL	TINLIB	BLCMP
Database contain MARC records	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Authority control file	Y	Y	Y	Y	Y	N	-	Y	Y	Y
Monographs records	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Serials records	Y	Y	Y	Y	Y	Y	-	Y	Y	-

Table 4.2
SEARCH FEATURES

	ONLINE CATALOGUE SYSTEM									
FEATURES	CARL	CAS	CITE	DYNIX	GEAC	LIAS	LIBERT AS	MEL VYL	TINL IB	BLCMP
ACCESS POINTS:										
Author	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Title Subject	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Author/Title	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Keyword access:to Author	Y	Y	Y	Y	Y	N	-	Y	Y	-
Title Subject	Y	Y	N	Y	Y	N	-	Y	Y	Y
	Y	Y	Y	Y	Y	N	Y	Y	Y	Y
Copy Location information	Y	Y	N	Y	Y	Y	Y	Y	Y	Y
Boolean operators	Y	Y	N	N	Y	N	-	Y	Y	Y
Browsing capabilities	Y	Y	-	Y	Y	-	-	Y	Y	Y
Display history of search strategy	Y	Y	N	N	Y	N	Y	Y	-	-
Menu Drive Approach	Y	-	Y	Y	Y	-	Y	Y	Y	Y
Command Driven Approach	-	Y	-	-	Y	Y	Y	Y	-	Y
Both Menu Driven & Command Driven Approach	-	-	-	-	Y	-	Y	Y	Y	Y
Cross-references	-	-	Y	-	Y	-	-	-	Y	-

Table 4.3

OUTPUT FEATURES

	ONLINE CATALOGUE SYSTEM									
FEATURES	CARL	CAS	CITE	DYNIX	GEAC	LIAS	LIBERT AS	MELV YL	TINL IB	BLCMP
Brief display	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Detailed (Full record) display	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Sorting of output & rank output in order of relevance	Y	-	Y	Y	-	-	Y	Y	-	Y
Printing displayed output facilities	Y	Y	Y	Y	Y	Y	-	Y	Y	-

Table 4.4

HELP AND INTERFACE FEATURES

	ONLINE CATALOGUE SYSTEM									
FEATURES	CARL	CAS	CITE	DYNIX	GEAC	LIAS	LIBERT AS	MELVY L	TINLIB	BLCMP
Easy to learn and use	Y	-	Y	Y	Y	Y	-	-	Y	Y
Integrated with other library components	Y	-	-	Y	Y	Y	-	-	Y	Y
Context sensitive online help	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Online link to a bibliographic utility	-	-	-	Y	Y	-	Y	-	Y	Y

Table 4.5

SCREEN FEATURES

	ONLINE CATALOGUE SYSTEM									
FEATURES	CARL	CAS	CITE	DYNIX	GEAC	LIAS	LIBERTAS	MELVYL	TINLIB	BLCMP
First screen identify library & Inviting	Y	-	-	Y	Y	Y	Y	Y	-	-
Indicate at every stage where the user is	N	N	N	Y	Y	N	Y	Y	-	Y
Search screen indicate number of records retrieved	Y	Y	Y	Y	Y	Y	Y	Y	-	-

4.5.2 Sample Screens

Three sample screens have been given in the Figures 4.1, 4.2, and, 4.3 to show us how some of the features discussed in section 4.4 have been implemented.

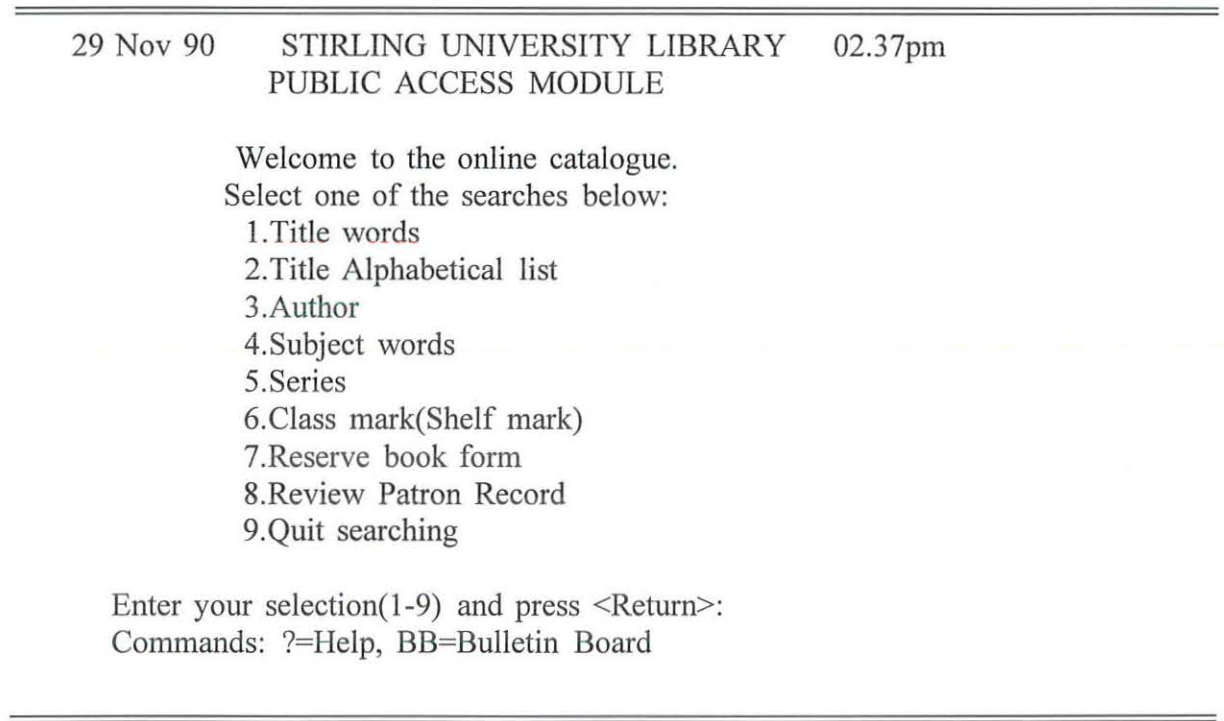


Figure 4.1 Stirling University Library UK - OPAC (Dynix)

Welcome Menu (Hunter and Bakewell 1992, 172)

Figure 4.1 shows a sample of a first screen of an OPAC system. It contains most of the features considered desirable for instance: It indicates the time, date, the University

library; and it is inviting to both novice and expert users. An expert user can proceed to searching while a novice user might need the help option made available.

SUBJECT KEYWORD ENQUIRY	Search Results
"training for online searching"	
61 items match your search closely (168 records found altogether)	
Use E if you want to add to your search to make it more specific.If you display the records the most similar ones should appear first	
Code	
D to display the records	
B to go back and do a new search of this type	
E to edit or amend this search	
/ to end or start another type of search	
? Help	
Enter code and press RETURN:	

Figure 4.2 LIBERTAS Display Screen (Tedd 1993, 158)

Figure 4.2 shows a sample of an output screen of an OPAC system. It has some features considered desirable for instance, it indicates that the search results are from a subject keyword search mode, it indicates the total number of records retrieved and the total number that closely match the user's search term. It also displays the results in order of relevance to the user's search. It gives the user an option to display the records, do a new search, or edit the current search. There is help option for those who need it.

Figure 4.3 shows an output screen which has some important desirable features. For instance, it indicates to the user that the search process is still going on, it indicates the location of the item, indicates the status of the book and directs the user where he can get more information. It gives a user an option to do a new search, repeat the display or quit.

WORKING...

AUTHOR(s): Lloyd, Christ Evert.

TITLE(s) : Chrissie, my own story/by Chris Evry Lloyd,
with Neil Amdur.

New York: Simon and Schuster, c1982.

OTHER ENTRIES: Lloyd, Christ Evert.

Tennis players United States Bibliography.

Amdur, Neil.

CALL#: GV994.L58 A33 1982 LOCN: PENROS STACKS

STATUS: Checked out--ask at CIRCULATION

<RETURN>to continue, <Q>UIT for a new search, or

<R>to REPEAT this display

>

Figure 4.3. CARL's Display Screen (Mathews 1885, 169)

Summary

We can summarise by saying that different library Management systems have adopted different OPAC features according to their specific environments. The desired basic features can be grouped as follows:

- Screen Features: The screens should be transparent and inviting.
- Database access features: The system should provide access to local as well as remote databases.

- Output features : The system should allow for display on screen, saving facilities and printing facilities.
- Search features : The system should enable the user to search the database using various access points.
- Help facilities including context-sensitive help features at any point.
- Any other specific features like bulletin boards.

The desired features for the proposed Egerton University Library System OPAC are discussed in chapter 6.

CHAPTER FIVE

SURVEY RESULTS : PRESENTATION AND ANALYSIS

5.0 INTRODUCTION

This chapter provides the survey results, their interpretation and analysis. The main objective of the survey was to find out the use of the card catalogue by the library users as well as the library personnel, and the problems they face. The survey results are presented in section 5.1 while section 5.2 gives the interpretation and analysis. Section 5.3 provides information on services offered by some computer vendors in Kenya, section 5.4 gives the summary of the survey results.

It should be noted here that the word 'library' has been used interchangeably with library system to refer to the Egerton University Library System, and not any one of the libraries.

5.1 PRESENTATION OF RESEARCH RESULTS

The survey methods that were applied to collect data have been discussed in Chapter 1. A total of 185 questionnaires were distributed out of which 138 were returned. Of the 138 questionnaires returned, 130 were completed while 8 were incomplete. Therefore, the results presented here are according to the 130 completed questionnaires that were received.

For easy analysis and interpretation, the questionnaire survey results have been presented in tabular form as shall be seen in the following subsections.

5.1.1 General Information on Users and their Use of the Library

It was necessary to find out the use of the library by the users hence various questions were asked to obtain the necessary information about the users and their use of the library system.

When the users were asked to indicate which languages they can read and write, 130 users answered as shown in Table 5.2.

Table 5.2 Language Capability of the Users

Language	Frequency	Percentage
English	130	100.0
Kiswahili	130	100.0
French	11	8.5
Others	43	33.1

As seen in the table, all the library users (100%), can read and write in English and Kiswahili languages, 8.5% can read and write in French while 33.1 know various other languages. Since most users are familiar with more than one language, the frequency is more than 130 and consequently, more than 100% percentage.

When users were asked to indicate the extent of importance of the library to them, 130 respondents answered this question as indicated in Table 5.3.

Table 5.3 Importance of the Library to the Users

Importance of library	Frequency	Percentage
Extremely important	45	34.6
Very important	58	44.6
Moderately important	26	20.0
Of no importance	1	0.8
Total	130	100.0

When asked how frequently they visit the library, 130 respondents answered this question as shown in Table 5.4.

Table 5.4 Frequency of Users' Visits to the Library

Visits to the library	Frequency	Percentage
Once a Week	14	10.8
Once in a fortnight	20	15.4
More than once a week	96	73.8
Never	-	-
Total	130	100.0

When asked for what reason they visited the library, 130 users responded as shown in Table 5.5. Some users chose more than one alternative and hence the total frequency is more than 130.

Table 5.5 Reasons for User Visits to the Library

Reason for visiting the library	Frequency	Percentage
Read & borrow books	113	86.9
Read newspapers & magazines	93	71.5
Make reference enquiry	84	64.6
Read own notes	75	58.0
Consult current Journals	69	53.1
write paper/lecture notes	52	40.0

When users were asked to indicate how they keep themselves up-to-date in their subject of specialisation, 129 users responded as indicated in Table 5.6. Some users

indicated more than one way hence making the total frequency more than 129 and percentage more than 100%.

Table 5.6 : Users Current Awareness Activities

How they keep abreast with current developments in their fields	Frequency	Percentage
Scanning periodicals and books on display	89	69.0
Through newsletters	60	46.5
Discussions and seminars	58	45.0
Consult librarian	31	24.0

When users were asked whether they visited other libraries or information centres, 127 users responded, 64.6% (82) said yes while 35.4% (45) said no.

5.1.2 Catalogue Use and Related Problems

The results on the use of the catalogue and the various problems that users face while using the catalogue are presented in this section.

When asked who does the searches for them when they need some information, 130 users responded, and their answers were as shown in Table 5.7.

Table 5.7 Users' Search Activities

Who does the searches	Frequency	Percentage
User him/herself	68	52.3
User with help of the library staff	60	46.2
Library staff	2	1.5
Total	130	100.0

When users were asked whom/what they consulted while looking for reading materials or information, 130 users answered as shown in Table 5.8. Some users indicated more than one option hence making the total frequency and the percentage more than 130 and 100% respectively.

Table 5.8 What Users Consult When in Need of Information

What they consult	Frequency	Percentage
Card catalogue	107	82.3
The shelves	31	23.8
Reference librarian	13	10.0

When the users were asked how often they used the card catalogue, 130 respondents answered this question as shown in Table 5.9.

Table 5.9 Frequency of Catalogue Use by Library Users

Frequency of catalogue use	Frequency	Percentage
Very often	92	70.7
Every library visit	17	13.1
Rarely	20	15.4
Never	1	0.8
Total	130	100.0

When asked to indicate the access points they use, 130 users responded as shown in Table 5.10. However, some users selected more than one access point hence making the total frequency more than 130 and consequently percentage of more than 100% percent.

Table 5.10 Access Points Used by Users While Searching the Catalogue

Access points	Frequency	Percentage
Author	43	33.1
Title	50	38.5
Subject	38	29.2
Call number	11	8.5

When asked whether they face any problems while consulting the catalogue, 130 users responded out of which 115 (88.5%) said yes, and 15 (11.5%) said no.

When further asked to indicate what type of problems they face while consulting the catalogue , 115 users said they had some problems while using the mentioned access points as shown in Table 5.11. Most of the users indicated more than one type of problem hence the total frequency is more than 115 and the percentage more than 100%.

Table 5.11 Problems Faced by Users while Using Various Access Points

Problems Faced	Frequency	Percentage
Difficult to know specific author name in advance	32	27.8
Difficult to know specific title in advance	82	71.3
Difficult to know call number in advance	19	16.5

When asked to state any other problems they face while using the catalogue apart from those indicated in Table 5.11, 83 users of the 115 users who said had problems while consulting the catalogue, gave a number of problems including those shown in Table 5.12.

Table 5.12 Other Problems Faced by Users while Using the Card Catalogue

Problems Faced	Frequency	Percentage
Some books of cards in the catalogue cannot be traced in the shelf	26	31.3
Congestion at the catalogue hence wait for long to use the catalogue	17	20.5
Cards are misfiled	16	19.3
Can't know whether a book is lost, borrowed or within the library	12	14.5
Cards of new books are not reflected in the catalogue	10	12.0
Books are wrongly catalogued	2	2.4
Total	83	100.0

When asked what they do when they encounter such problems, 112 users answered as shown in Table 5.13.

Table 5.13 Users' Reaction on Encountering Problems While Using the Catalogue

What they do	Frequency	Percentage
Get help from the library staff	83	74.1
Leave the library without the information needed	16	14.3
Get help from the user next to her/him	13	11.6
Total	112	100.0

When the users were asked how they prefer their search results presented to them when they place their search queries at the reference section 130 users responded as can be seen in the Table 5.14.

Table 5.14 Search Output Format Preferred by the Users

Search output Format	Frequency	Percentage
Full-Length	55	42.3
Abstract	67	51.5
Graphical	8	6.2
Total	130	100.0

When users were asked to give their opinion about the currency of the catalogue, 128 respondents answered this question as shown in Table 5.15.

Table 5.15 Currency of the Card Catalogue

Currency of the catalogue	Frequency	Percentage
Up-to-date	45	35.1
Outdated	66	51.6
Extremely outdated	17	13.3
Total	128	100.0

When users were asked to give their opinion about the general services provided by the library, 130 respondents answered as shown in Table 5.16. Some users indicated that the services are both inadequate and untimely. Hence, the total frequency is more than 130 and percentage more than 100%.

Table 5.16 Users' Opinion of the Library Services

Opinion	Frequency	Percentage
Adequate	34	26.2
Inadequate	88	67.7
Timely	8	6.2
Untimely	10	7.7

When asked to give suggestions as to how the mentioned problems might be solved and hence improve the services, 88.5% (115) of the users said, there is need to improve the services of the library system. In fact, 37.4% (43) of the users who had this opinion said that computer technology in particular would solve the problem.

When asked how the computer-based catalogue would improve the services, 67.7% (88) of the users said it would make services more effective and efficient. However, of the 88 users who answered this question, 74 of them were more specific and enumerated the benefits as shown in Table 5.17.

Table 5.17 Benefits of a Computer-Based Catalogue as Envisaged by the Users

Envisaged Benefits	Frequency	Percentage
Faster to search, hence save time	37	50.0
Easy to locate and retrieve books	25	33.8
Possible to tell whether a book is lost, borrowed or within the library	10	13.5
Increase access points	2	2.7
Total	74	100.0

5.1.3 Computer Literacy of Users

When users were asked whether they have ever used computers before, 125 of the users responded, 63 (49.2%) said yes, while 65 (50.8%) said no.

When users were asked to mention where they had used the computers, 63 users mentioned the places shown in Table 5.18.

Table 5.18 Use of Computers

Place	Frequency	Percentage
Computer department	42	66.7
Office	16	25.4
Home	5	7.9
Total	63	100.0

When they were asked which software packages they were familiar with, the 63 users who are familiar with computer knowledge answered as shown in Table 5.19. Some users indicated that they were familiar with more than one software hence the frequency is more than 63 and percentage more than 100%.

Table 5.19 Software Packages most Users are Familiar with

Software	Frequency	Percentage
CDS/ISIS	5	7.9
dBase	37	58.7
WordPerfect	50	79.4
Others	27	42.9

Asked whether they have ever used an online catalogue before, of the 99 users who responded, 92 (92.9%) of them said no, while 4 (4%) said yes.

5.2 INTERPRETATION OF THE RESULTS

The results tabulated in section 5.1, have been analyzed in this section. To ensure consistency of the research findings, results of the observation and the interview are also analyzed in this section.

5.2.1 General use of the Library

As shown on the survey results in section 5.1, Egerton University Library System is of utmost importance to the users. As can be seen on Table 5.3, 44.6% (58) of the users said it is very important, 34.6% (45) said it is extremely important, 20% said it was moderately important, while only 1 user (0.8%), maintained that it is of no importance to him/her.

The importance of the Library to the users is further indicated by the fact that majority of the users frequently visit the library. As indicated in Table 5.4, 73.6% (96) of the users visit the library more than once a week, 10.8% (14) once in a week, and 15.4% (20) once in a fortnight.

These users visit the library for a variety of reasons. As indicated in Table 5.5, 86.9% (113) of the users visit the library to read and borrow books, 53.1% (69) visit the library to consult current journals; 71.5% (93) to read newspapers and magazines; 64.6% (84) visit to make reference enquiry; 58% (15) visit to read their own notes; and 40% (52) to write papers and/or prepare lecture notes. Therefore, we can say that the various types of the information materials held in the libraries are very important to the users. Provision of easy access to these materials therefore is of utmost importance.

In addition, the users keep themselves abreast of the developments in their fields of specialisation in various ways. As indicated in Table 5.6, 69% (89) do so by scanning or looking at the new periodicals and books in the display section, 46.5% (60) through reading newsletters and magazines, 45% (58) through discussions and seminars, and even some (24%) consult the librarian on any new and current items on their subject of interest. This shows that currency of the information materials is also very important to the users. They try their best through means convenient to them to find out the current and relevant items stocked by the libraries. Easy and timely access to current information materials should therefore be a great concern of the library.

It was also discovered that quite a number of the users (about 35%) do not even visit other libraries or information centres. This means that they rely totally on the

Egerton University libraries for all their information needs. Hence, it is necessary to improve the services rendered by these libraries, and in particular, access to information if the users' needs are to be satisfied.

5.2.2 Card Catalogue Use and the Related Problems

The results on the use of the catalogue, and the various problems that users as well as library personnel face when using the catalogue are interpreted and analyzed in this section.

5.2.2.1 Problems Faced by the Users

The users who frequently visit the library for the various reasons stated in section 5.1, look for information materials or search for information in two main ways. As indicated in Table 5.7, 52.3% (68) of the users search for materials by themselves while 46.2% do it themselves with some help from the library staff. We can therefore conclude that most users like being in control of their information seeking activities in order to get the most relevant information materials to their information needs. This self information seeking behaviour, should therefore be encouraged if maximum satisfaction of the users' needs is to be achieved.

When they do searches at the reference section, most users (51.5%) as shown in Table 5.14 like their search results presented in abstract form, while 42.3% would like to get full or original document. However, this was usually quite difficult for the reference staff to accomplish. Most of the times the reference staff presented the search

results to users in form of call number and the title of the located information materials, and advise them where to get the information materials from.

The library card catalogue plays a major role in the information seeking activities of the users. As the results in Table 5.8 show, 82.3% (107) of the users consult the card catalogue, 23.8% (31) look for documents on the shelves, while 10% (13), consult the reference librarian when they need information.

As shown in Table 5.9, most of the users (70.7% (92)) make use of the card catalogue very often. Others, 13.1% (17) make use of it every library visit, while 15.4% (20) use it rarely and only 0.8% (1) never make use of the catalogue. Therefore, the catalogue is a very important tool in enabling users get access to the required information. It is a tool without which most of the users cannot get access to the materials held in the libraries, especially those who totally rely on the catalogue.

Since majority of the users make use of the catalogue, this means information materials not reflected in the catalogue are unlikely to be utilised since most users would not even know of their presence in the library. To ensure maximum utilisation of the library's holdings therefore, it is necessary that all acquired and processed materials are reflected in the catalogue.

While consulting the card catalogue, the users make use of four main access points: the author name, title, subject and call number as indicated in Table 5.10. Majority of the users, 38.5%(50) use the title, 33.1% (43) author name and 29.2% (38), the subject heading. Only 8.5% (11) use the call number. This shows that most users

make use of known item search, and though the catalogue cards have other data elements like publisher, date of publication, place of publication, edition statement, ISBN, and ISSN, it is only possible to search the catalogue using the access points provided like author name, title, subject heading and call number. These access points are quite limited. If full utilisation of information resources is to be realised more access points should be provided.

As had been stated earlier on in Chapter 3, the main public catalogue is arranged alphabetically by author or title (the author/title catalogue), and alphabetically by subject (subject catalogue). Therefore, we can conclude that those who used the call number must have done so in the periodical and/or the reserve section as these sections maintain catalogues sequentially arranged by call number.

According to the survey results in Table 5.11, most of the users (88.5%) face a number of problems while consulting the catalogue. While using the mentioned access points, 71.3% (82) of the users said it is difficult to know in advance the specific and correct title. It was also indicated by 27.8% (32) users that knowing the specific and correct author name in advance is difficult. In addition, 16.5% (19) of the users indicated that it is difficult to know the correct call number in advance.

These problems were also voiced by some users who were interviewed while they were consulting the catalogue. It was also observed that some users approach the catalogue, flip through a few cards and then approach the reference staff for assistance. Conversation with such users revealed that sometimes users approach the catalogue with author names and titles only to discover that they were not having the correct details, as

such a book does not seem to exist in the catalogue. However, users maintained that they had seen such a book before but now cannot remember the exact title or author name, and are therefore unable to locate the book. This means that sometimes the users approach the catalogue thinking they know what they are looking for only to discover that the information they have is not correct.

Apart from the problems related to the access points, users indicated various other problems they face while using the card catalogue. The survey results in Table 5.12 shows that, 31.3% (26) often get cards in the catalogue but when they look for the books on the shelves they cannot get them. The users then get frustrated engaging in fruitless search for materials they have identified in the catalogue but not within the library. This also shows that the card catalogue is not up to date.

When faced with such a problem, they would like to know where the book is, but 14.5% (12) of the users indicated that it is often not possible to know whether the book is lost, borrowed or still within the library. Some users 12% (10), indicated that most of the new books on display or even on the shelves had no cards in the catalogue reflecting their presence in the library. They therefore say it is difficult to make maximum utilization of some relevant and current materials, which are not reflected in the card catalogue.

In addition, users (19.3%) say that even when the cards are in the catalogue, most of the times they are misfiled, hence make it difficult to get access to some materials as the catalogue is arranged in alphabetical order and if the card is not in its proper place

then it is difficult to locate it. Some of the users (2.4%), even indicated that the books are wrongly catalogued and classified.

As is evident in Table 3.1 in Chapter 3, the library has a shortage of professional staff. Most of the staff (76% of the total staff population) are either totally untrained or are para-professionals with either ordinary diploma or certificate level training. According to the head of cataloguing section, this leads to many errors in the cataloguing and classification of books as well as misfiling of cards, leading to wrong location of books on the shelf. This reduces the chance of retrieval of these materials as they are not found within their known subject areas. In addition, the manual cataloguing, classification and filing to a certain extent relies on human judgement of the cataloguer. This at times leads to inconsistency in these manual operations.

The problems faced by the users were further confirmed through interviews with staff in the cataloguing section. The head of the section admitted that the labour required to establish and maintain the card catalogue is often very high. This includes labour involved in creating the cards, sorting and interfiling the new cards, removal of cards whose books are lost or withdrawn from the shelves, and modification and refiling of the existing cards. Multiplication of cards for filing under various headings such as author name, title and subject headings as added entries increase the number of cards to be produced. This in turn increases the cost of cataloguing as well as the time spent to produce the cards, sort them and file them, and update the catalogue. Hence, often, books are taken to the shelf after they have been catalogued, before their catalogue cards are entered in the public catalogue.

The survey results in Table 5.12 also indicate that, the card catalogue is not adequate to serve all the users, as 20.5% (17) of the users indicated that sometimes there is so much congestion at the card catalogue and the users have to wait for a long time before they get access to the catalogue. In particular, in Laikipia and Kisii Campus libraries, the card catalogues are so small that only one or two users can use them at any one time. This discourages users from getting access to the materials as some of them do not want to spend some time waiting on the queue.

When users encounter the mentioned problems, they react in different ways. As indicated in Table 5.13, some of them (11.6%) try to get help from fellow users, 74.4% (84) turn to the library staff for help, while 14.3% leave without getting the required information. Therefore we find that, the mentioned problems hinder utilization of the library materials by quite a number of users. The results also show that library staff, especially the staff at the reference desk have a great task in trying to help the users get access to the information they need. The users also indicated that it is sometimes difficult to get any assistance from the library staff as sometimes there are too many users for the staff to handle. To ensure timely and maximum utilisation of information therefore the access media to the information materials should be easy to use to enable users get access to information without much problems or assistance.

The survey results in Table 5.16 indicated that, the services rendered by the library system are generally inadequate and untimely. As shown on Table 5.16, 67.7% (88) of the users said the services are inadequate, 7.7% said they are untimely. Only 6.2% said the services were timely, while 26.2% said the services are adequate.

Therefore, there is need to improve the services rendered by the library system in order to satisfy the users' information needs.

In particular, the results in Table 5.15 shows that 51.6% (66) of the users indicated that the card catalogue is outdated, and 13.3% (17) said it is extremely outdated. This means that the users are not able to have access to the current and relevant materials, as it takes a long time to update the catalogue. Therefore, there is need to provide a catalogue system that would ensure easy, timely and accurate access to current information.

These users' opinion on currency of the catalogue were further confirmed by observation results, as well as results obtained through interviews with the library staff. It was revealed that the catalogue is rarely updated, and hence does not reflect the actual library holding. Interviews with the staff in the cataloguing section confirmed that due to shortage of staff, the catalogue is not updated as frequently as is required. In fact in Kisii library, the catalogue is updated only once in a year.

Some of the books are long lost or withdrawn but the cards are still in the catalogue. Even the books in the reserve section, their cards are in the main catalogue with no indication of their whereabouts. It therefore becomes very difficult for users to locate materials in the library. The books which were transferred to FASS library their cards are still in the main library card catalogue with no indication on the card that the book is available in the FASS library. The main library card catalogue contains some records of single copy books that are not available in the branch or departmental libraries. Yet the catalogue does not even indicate which books are available in Laikipia or Kisii.

The catalogues at Kisii and Laikipia do not indicate which books are available in the main campus either.

In addition, it was observed that, library users get inconvenienced as they are not allowed to remove cards from the trays for photocopying and they have to take notes or the necessary details, usually while standing no matter how many books the users may be interested in. There are also problems in catalogue editing and use especially when the cards are consequently packed too tightly for ease of use. This makes the catalogue vulnerable to some vandalism for instance, users who are lazy to stand and take down the bibliographic details sometimes pluck off the cards to use them later.

It was also observed that the catalogue cabinets are made up of wood hence may catch fire easily.

According to the survey results in Table 5.17, fast and easy access to the information materials is of utmost priority. As indicated in Table 5.17, 50% of the users think that an online catalogue would enable them to locate the materials very fast, and in the process save their time as well as the library personnel's time that is currently wasted using the manual card catalogue. Users (33.8%) also think that with an online catalogue it would be easy to locate and retrieve books. As has already been said, users are often not in a position to tell whether the book is borrowed, lost or it is within the library. Users (13.5%), therefore think the computer-based catalogue would be able to tell whether the book is borrowed or within the library. Some users (2.7%) also expect a computer-based catalogue to provide more access points including the author, title, accession number, ISBN, ISSN, class number, and date of publication.

Some users even indicated that a system that would indicate whether a book is borrowed and when it would be returned would be good so that the users would be able to reserve the book and pick it when it is returned.

5.2.2.2 Problems Faced by the Library Personnel

Due to the increasing number of the users, the library had to acquire more books than ever before, to keep up with the increased demand for the reading materials by the users. This placed a heavy and unmanageable burden on the typing resources of the library. As a result there is a backlog of over 400 untyped catalogue cards. Due to this, it was observed that there are many handwritten cards in the main card catalogue as well as in the shelf list. Due to continuous use of these catalogues, the flimsy cards are worn out and torn. Some of them are no longer legible. This then reduces the utilization of the information material represented by these particular cards.

The staff further reported that in order to cut down on the time spent cataloguing books and filing cards, old items are usually neglected, hence, curtailing utilisation of such materials.

Through observation and conversation with the library staff, it was gathered that the manual system is very ineffective as far as record management is concerned. It is often very difficult to maintain up-to-date and accurate records of the library holdings. If there are any changes in the location of the information materials, it takes a lot of time and effort to organise the records. For instance, since CWSGA and FASS libraries were established in 1992 and 1994 respectively, the records are not yet organised and hence

it is not possible even to establish how many titles they have so far. Yet any meaningful and proper planning and management of the library heavily depend on the accurate records of the library.

The manual system also leads to duplication of staff effort in the generation of catalogue entries. Item identification information might have to be repeated for a number of separate sequences, for instance, some of the data elements used at the acquisition section are also used at the cataloguing section (see Chapter 3 section 3.5) but due to the manual operations, these elements have to be written at both stages. This then puts more pressure on the scarce labour resources of the library.

Duplication of staff effort also is due to the fact that the card catalogue as well as the shelf list are not frequently updated. In addition, some of the records are illegible. Staff at times are unable to locate old records, and catalogue newly acquired materials, only to discover later that there are old copies of the same books in the library which were already catalogued.

Staff also complain that the most tiring, boring and time consuming task is the sorting, filing and updating of the catalogue.

The card catalogue is vulnerable to intentional or inadvertent damage or destruction. For instance, in August 1995, during a student demonstration at the Main campus, the students went into the FASS library and dismantled the card catalogue, bringing down all the cards. Refiling these cards was a tiring and demoralising task. The

incident also impaired the library's ability to function for quite a number of days. They therefore advocate for a system that would solve such problems.

Staff from Kisii and Laikipia also said that they frequently need materials from the main library for their users but due to the great distance between their libraries and the main library, they cannot access the main public catalogue at any time. In particular, Kisii library staff indicated that they cannot visit the Main library every time a need arises, and frequently have to rely on the administrative and academic staff visiting the main university for their own purposes, to collect the needed materials. This system is very inefficient and frustrating to the users as they cannot get timely access to the relevant information.

Sometimes the library staff take the trouble to travel to the main library for information materials only to find that they are not available. In this case, the time and energy, which would have been saved were it possible to tell in advance whether the information materials are available or not, is wasted.

As the survey results in Table 5.5 show, quite a number of users, 64.6%, visit the library to make reference enquiries at the reference section. It was also indicated in chapter three that users are supposed to fill forms indicating their specific search topics as precisely as possible. However, interviews with the reference section staff revealed that, the users at times do not fill the forms well, and the reference staff have a problem in pinpointing the actual information need of the users. The keywords are sometimes not entered properly and precisely either. This results in the staff retrieving and presenting

results that are not specific to the users' needs. Sometimes the reference staff is forced to interview them in order to clarify further on their topics. This consumes a lot of time.

The other problem faced at the reference desk is that, the user can not get the feedback immediately. As was indicated in chapter three, users are required to fill enquiries form shown in Figure 3.5, and then check for the results on a later date. Some of the users approaching the reference section for reference enquiries were also observed. Through observation of their facial expressions, gestures, and conversation with the staff, it was gathered that they were often not happy with the idea of having to wait for two or three days before getting their search queries. This is because most of the users who come with queries are students or academic staff, who need these materials to write their research papers or examination. By the time they get the information some of the users have already handed in their papers. Therefore, this system is not effective as it does not give timely information. A system which would allow users to conduct search and get results there and then would be of great help to the users.

Some users also find going through the catalogue a cumbersome and time consuming exercise as they may not know the exact title, author name or class number of the books. In this case some approach the library staff to do the searches for them. Therefore, though users are expected to consult other information materials in the library before approaching the reference librarian, they rarely do so, but want the librarian to do all the searches for them.

It was also observed that the catalogue does not hold records of books on order or being processed.

5.2.3 Computer Literacy of the Users and the Library Personnel

The survey further revealed that a good number of the users have at least basic computer knowledge. Results presented in section 5.1.3 indicate that 49.2% (63) of the users have used computers before. Of these users, 66.7% said they used computers in the computer department in the university, 25.5% used them in their offices and 7.9% used them at home, as indicated in Table 5.18. Table 5.19 indicated that most of them are familiar with MS DOS, WordPerfect, dBase, and CDS/ISIS, among other software packages.

However, even though about half of the user population are familiar with computer technology, only 4% have used online catalogues before. This means that if the proposed system has to succeed, great effort has to be put into training the users.

The survey also revealed that of the 105 library staff, about 20 have some basic computer knowledge. The software packages most of these staff members are familiar with include dBase, CDS/ISIS, Clipper 5, Lotus 1-2-3, WordPerfect and Pascal programming language.

Therefore if the proposed system was to be implemented, there would not be much problems since a good number of the users and library staff are already familiar with the computer technology. However, a training program for users as well as the library personnel has to be planned for the rest who are not familiar with the technology.

5.3 COMPUTER SERVICES IN KENYA

To get some information about the type of services computer vendors offer in Kenya, seven questionnaires were distributed. Out of these, four were returned and the results are presented in this section. These computer vendors have been numbered from 1-4 as follows: Abaws Computer Centre [1]; Datasolv [2]; Data Centre [3]; Nakuru Computer Centre [4].

As can be seen from Table 5.20, the computer vendors market mainframe, minicomputers and microcomputers. The microcomputers are mostly IBM compatible computers. Most computers sold in Kenya have up to 420 MB and 540 MB disk capacity.

Table 5.20 Type of Computers Sold in Kenya

	COMPUTER VENDOR			
TYPE OF COMPUTER	1	2	3	4
Mainframe	N	Y	N	N
Minicomputer	N	Y	N	Y
Microcomputer	Y	Y	Y	Y

The software packages sold by these vendors include, MS DOS, MS Windows, Novel Netware, WordPerfect, dBase Accounting packages, Foxpro and UNIX among others. It was however noted that none of them indicated that they market any library management software package.

These vendors offer various other services to their clients including the ones indicated in Table 5.21.

Table 5.21 Services Offered by Computer Vendors in Kenya

	COMPUTER VENDOR			
SERVICES OFFERED	1	2	3	4
Consultancy	Y	N	Y	Y
Training	Y	Y	Y	Y
Hardware & Software Training	Y	Y	Y	Y
Installation Support	Y	Y	Y	Y

The survey results imply that if the proposed system is to be implemented, then the software might have to be imported. However, the hardware may be locally purchased.

5.4 SUMMARY OF THE SURVEY RESULTS

From the research results presented in this chapter, we can conclude that the library system is very important to the users, as shown by their frequent visits to the libraries for various information needs. The users use the catalogue as a tool to gain access to the information materials. However, the survey revealed that there are a number of problems that are faced by the users. In order to solve these problems and make the information services rendered by the library system more efficient, the users suggested computerisation of the library operations and in particular, the public card catalogue.

The users even enumerated a number of the benefits they expect to get from such a computer-based catalogue system. These will be used as requirements of the proposed OPAC system with features considered most important to the users needs. The proposed system is discussed in the next chapter.

REQUIREMENTS AND FEATURES OF THE PROPOSED EGERTON UNIVERSITY LIBRARY ONLINE PUBLIC ACCESS CATALOGUE (EULOPAC) SYSTEM

6.0 INTRODUCTION

This chapter deals with the proposed system which is expected to solve the problems stated in Chapter 5, and hence enhance users' timely access to relevant information materials at the minimum cost of time and energy. The chapter provides information on the requirements and desired features of the proposed system.

6.1 PROPOSED SYSTEM'S REQUIREMENTS

From the survey results presented and analyzed in Chapter 5, we can deduce a number of user requirements to be fulfilled by the proposed system. These requirements are as follows:

- The databases should contain only records of materials that are still available for users. Records of books withdrawn from the shelves and lost items should be deleted with ease from the database files as soon as possible.

- The system should provide access to the database by several users at any time, hence save the time of the users.
- Since some users have computers in their offices, the system should make it possible for users with their own terminals or computers connect to the online catalogue.
- The system should be designed in such a way that the users do not have to know the full bibliographic details like full author name or the title in advance, in order to retrieve information.
- The system should provide access to the database through other access points besides author name, title, and subject.
- The system should show records of items in cataloguing process, to let the users know the newly acquired books in their fields of specialisation; and hence provide access to current information materials.
- As the survey results analysis indicated, users prefer doing searches by themselves. Therefore, the system should be designed in such a way that the user can do searches him/herself with minimum help from the library staff.
- There should be a system to enable the library staff create machine-readable records of materials as soon as they are acquired, hence ensure that there are no backlogs in record creation. Creation of machine-readable records will ensure that

there are no illegible handwritten cards in the public catalogue and shelf list, and will eliminate the tiring and time consuming task of filing cards.

- There should be a system that helps solve the problem of wrongly catalogued and misfiled cards by providing a standard data entry format, and hence maintain high level of accuracy for easy retrieval of information.
- The overall process of adding to, editing and deleting catalogue entries should be easy, and hence reduce staff effort and time spent performing such operations.
- The system should provide fast access to the database and hence the information.
- The system should maintain up-to-date and accurate records, and hence facilitate easier planning and management of the library operations, as well as reduce duplication of staff efforts in record creation.
- The system should facilitate resource sharing between the libraries through provision of a union or central catalogue.

6.2 DESIRED FEATURES OF THE PROPOSED OPAC SYSTEM

From the requirements presented in section 6.1 together with some selected features from Chapter Four, we can define appropriate and important features of the proposed OPAC system, to satisfy the needs of the users.

6.2.1 Search Features

- Users should be able to search the database using the author name, title, subject, keywords, ISSN, ISBN and the location of the book. However, other fields like the edition statement and year of publication should also be indexed so that they could be used as access points in combination with other fields for instance, a combination of author name and year of publication.
- Since most of the users indicated that they have problems knowing in advance the full author names and titles of the items, the system should provide facilities for displaying terms dictionary containing author name, title, subject headings etc. In addition, it should also allow users to truncate their search terms as this will reduce cases of wrongly entered search terms and hence increase recall rate.
- Dictionary search facilities should be provided as this will help the users determine the exact form and/or spellings of entry of a subject heading or author name. In the process of browsing through the terms dictionary, the users may also find items similar to an item known to be useful.

facilities to assist the users carry out search activities. In particular, the system should provide the following help facilities.

- The OPAC should be able to give some indication to the user about where they are, and how they can go back from where they came from.
- The system should provide context-sensitive help facilities at each stage when called for. For instance, users should be able to get help on how to search using author name, title, call number, location etc, at the appropriate search screen.
- The help messages should be presented in such a manner that they are easy to understand, and provide direction that enables the searcher to return to the search screen from where the help was first called.
- Since most users have never used online catalogues before, they are bound to make a number of mistakes and may repeat them several times. Therefore, the system should be designed in such a way that it should give automatic help for repeated mistakes.
- The OPAC system should inform the user whether his/her search is successful or not. For instance, indicate that the search term retrieved a certain number of records or no records were retrieved. If the user's search term retrieved no records, the user should be given an option to edit commands that failed if necessary.

- Some intermediate responses should appear for long search, for instance, indicate that searching is still in progress.

6.2.4 Screen Features

- The first screen of a new session should identify the library the user is searching from. It should also be clear and inviting to the users, giving the users an option to some general information on how to use the system (for those who are not familiar with the system), or go straight to the search services.
- The screens should indicate where the user is at every stage, for instance, indicate whether the user is in author or title search screen.
- Use of blinking cursor, sound, and reversed colour text, should be minimised since such features quickly become distractions after the initial goal of attracting the user's attention has been met.
- In each screen, there should be some indication of how to quit and how to get help.

6.2.5 Interface Features

- Since most users have never used online catalogues before, the interface should be easy enough for the users to learn and use with limited support from printed materials or library staff members.

- The system should give both menu-driven and command-driven approaches so that it is not boring for the few users who have used online catalogues before, yet easy enough for the majority of the users who will be using the online catalogue for the first time. However, since most users are novice users, the menu-driven approach should be given first priority.
 - The interface should be designed in such a way that there is a two-way communication or dialogue between the users and the system.
-
- Since all the library users can speak and write in English language and the current card catalogue is in the same language, the search interface should be in English language.
 - The system should be designed in such a way that it is possible to add, change or remove some interface features, for instance, modify the way a user enters a search, without changing the basic structure of the online catalogue system.

6.2.6 General Information Awareness Features

The system should have a bulletin board, which should be provided as an option for the users to view or read through major developments taking place in the library system especially as far as information materials are concerned or any other information that might be of interest to the users.

6.2.7 Database Features

The proposed system should have at least two major types of databases, the bibliographic database and the users database.

6.2.7.1 Users Database

- The users database should contain information about the valid members of the library system. This database should be designed in such a way that it is easy to delete and add records whenever necessary as the library membership keep on changing as student users leave the University every year, while others join.
- The Main university library and Kisii campus library should maintain their separate users databases that are available only in their locations. However, Laikipia campus should have a users database whose records are available at Laikipia Library, but also reflected at the Main library database. This is because the students in Laikipia campus are sometimes transferred to the Main University for a semester or two.

6.2.7.2 Bibliographic Database

For the bibliographic database, the following features should be considered:

The system should provide access to monographic materials database, Serials database, and Technical reports database. For each of these databases, there should be a

central database at the main campus library which would contain records for the whole library system's holdings.

- In addition, each of the other libraries should have bibliographic databases indicating the books they hold.
- The system should be able to maintain authority control files, for instance, support authority file for names and subject heading with appropriate cross-references.

Maintenance of authority files will ensure data validation during record creation so that wrong record format and the problem of wrong cataloguing are solved.

- The computer-based catalogue record should contain at least all the data elements present in the current catalogue card, and some additional fields that may be necessary for easier retrieval of the bibliographic items.
- During database creation, all the fields that may be used as access points should be indexed.
- The system should be able to generate some statistical reports. For instance, be able to calculate and indicate the number of items the database holds on particular subjects, as well as the number of items acquired in a particular year. This will also ensure accurate and up-to-date record management.
- The database should be updated as frequently as possible so that records of lost items and/or withdrawn items from the shelves are no longer reflected in the

catalogue, while records of current and newly acquired materials are entered as soon as possible.

- Several terminals should be provided through which the database can be accessed by a number of users at the same time.
 - The database should indicate the materials being processed in order to make the users aware of the newly acquired books in their fields of specialisation.
-

6.3 STANDARD FORMATS

For consistency purposes and for efficient management and maintenance of the records and hence the databases, the databases mentioned in section 6.2.7 should be created according to certain standard formats.

6.3.1 Output Format

The library system currently use the AACR2 for cataloguing. Therefore, the same output format is recommended for cataloguing of the computer-based records.

6.3.2 Input Format

Various input formats were considered including: MARC (Machine Readable Cataloguing) (MARC manuals....1970 and Crawford 1984); CCF (Common Communication Format) (Simmons and Hopkinson 1992); MIBIS (Microcomputer-Based

Bibliographic Information Systems) (Lauro 1990); and ABNCD (Abebe, Bernard, Neelameghan, Caroline, Dorothy) (Abebe et al 1992). Of the mentioned formats, the MARC Format has been recommended.

MARC format was developed in the United States by the Library of Congress in 1965-66. This format was found more appropriate for the proposed system due to the following reasons:

- The proposed system has creation of bibliographic records for books as a major prerequisite. MARC seems to satisfy this objective well since it was initially developed as a MARC bibliographic format for books. "This book format is the best established of all formats and possibly the most stable format" (Crawford 1984);
- Egerton University Library System currently uses the AACR2 as an output format. Therefore, the MARC format seems more appropriate as it supports the AACR2 fully.
- As already indicated by the research results, the catalogue card has failed to communicate effectively to the users due to various factors, for instance, limited access points. This problem can be solved through use of MARC Format because the MARC record contains all the data fields on a catalogue card, and many more fields necessary for easy retrieval of bibliographic items. Therefore, MARC format records communicates bibliographic information with more precision and flexibility than the printed catalogue (Crawford 1984);

- MARC Format also provides flexibility needed for individual libraries, which may add information to MARC records, define fields for local use, and rearrange existing information (Crawford 1984);
- MARC format has been widely used in academic libraries and bibliographic utilities, and hence is quite established. In addition, as card catalogues decline and online catalogues take their place, resource sharing becomes quite necessary and the USMARC can be used both as communications and a processing format (Crawford 1984). For possible future resource sharing with other libraries, MARC is more appropriate for the proposed system.

In particular, the USMARC Format was found to be more appropriate because it supports LC classification rules, used by the Egerton University Library System.

The USMARC Formats are standards for the representation of bibliographic and authority information in machine readable form. The structure of USMARC records is an implementation of the American National Standard for Information Interchange on Magnetic Tape (ANSI Z39.2 1979) and of Documentation Format for bibliographic Information Interchange on Magnetic Tape (ISO 2709 1973) (Atting 1983).

All information in a MARC record is stored in character form. The data in a MARC record is organised into fields each identified by a 3 character tag. According to ANSI Z39.2 1979, the tag must consist of alphabetic or numeric basic characters, and USMARC Formats use only numeric tags. The MARC format allows specification of a record length of up to 99,999 data characters (Atting 1993).

USMARC Format for bibliographic data contains format specifications for encoding data elements needed to describe, retrieve and control various types of bibliographic materials.

USMARC Formats for authorities is used to build and maintain authority files for reference and for control (Crawford 1983). Authority files improve efficiency of an online catalogue by filtering searches through the authority system.

7.1.2 Bibliographic Database (OPAC)

A prototype bibliographic database (OPAC) was also designed. OPAC is an integrated database designed for monographs, serials, reports and cartographic materials. This database has been developed according to the MARC format. Some local modification was made to enable the format that was implemented on CDS/ISIS platform generate the required output.

Integrated FDT and FST were designed to cover for the monographs, serials, technical reports and cartographic materials. The FST was designed keeping in mind the access points preferred by the users as indicated by the survey results in Chapter 5 Section 5.2.2.1.

To facilitate easy and fast data entry operations, different data entry worksheets namely OPAC for Monographs, SERIA for Serials, REPT for Reports, and CART for cartographic materials were created for the different materials. Different display formats with the same names have also been created for the different types of materials.

The FDT, Data entry Worksheets, FST and the Display formats have been presented in appendices VA - VJ.

Two types of display formats were designed to produce output according to the recommended AACR2 format. Records searched through EULOPAC may be presented in both brief display or detailed display formats.

7.2 PROTOTYPE OPAC INTERFACE MODULE (EULOPAC)

A prototype OPAC program module called EULOPAC (Egerton University Library Online Public Access Catalogue) was developed to demonstrate how the proposed OPAC system might be. This module was developed using the ISIS Pascal interface and it runs on CDS/ISIS software version 3.07, available at SISA. EULOPAC was developed in a LAN environment at SISA which is in line with the requirements in the real life environment when the proposed system would be implemented.

EULOPAC provides access to books, serials, reports and cartographic materials database developed in CDS/ISIS as discussed in section 7.1.

7.2.1 User Interface

When using EULOPAC, the first screen that appears is the identification screen, identifying the library and welcoming the users to the EULOPAC services. This screen also shows the date and time of the day. The user has an option to get an introduction to the system by pressing F1 or go straight to the search services by pressing any key, if the user is already familiar with the OPAC system. Therefore, both novice and expert users would know how to go about using EULOPAC.

To carry out searches, there is a 'Search Options Menu' screen which provides a menu of various search options through which a user can search the database. These search options are activated by pressing one corresponding letter, for instance 'A' for **Author Search**.

Once the user has pressed a valid letter to select a search option, a search screen appears according to the user's option. At this stage the user is prompted to enter a search expression. On entering an expression, search will be conducted and if the search is successful, the number of records found matching the search expression are displayed. The display screen then appears and the user is asked to select one of them either brief or detailed display. Otherwise if the search expression was not successful, then a message appears to tell the user that the particular expression does not exist in the database.

Searching is largely menu driven whereby a user is provided with a menu almost at every stage, which can be activated by pressing one letter. There is a two way communication between the user and the system, for instance, the user may be asked whether he/she wants some more records to be displayed or not, upon which the user may answer yes or no.

All the search screens have specific labels hence clearly indicate where the user is for instance, in 'Keyword Search'. It is also indicated how the user may go out of that particular screen, for instance, 'press ESC to go back to the Search Options Menu'.

The search language provided for searching EULOPAC is the English language which was found to be familiar to all the library users (see Chapter 5 Table 5.2).

7.2.2 Search Features

The OPAC system can be searched using various access points provided as a menu including Author Name, Subject Keyword, Title, Class number, Series Title,

Location, Publisher and Place of Publication, and ISBN. Most of these access points were recommended according to the analysis of the research finding in Chapter 5 Section 5.2.2.1. However, other access points like Edition statement and ISSN have also been provided in this system to make search activities even more flexible and consequently increase accessibility to the library materials.

The user may also search through the terms dictionary which provides a list of terms from which the user can pick search expression(s). The user may use truncation using a dollar sign. For instance, a search term 'Africa' may be truncated as 'Afr\$'. Boolean operators like AND, NOT and OR may also be used.

The truncation and terms dictionary search facilities will enable users get easy access to the library materials even if they do not have full bibliographic details of the document of interest.

7.2.3 Output Features

Once the user's search expression is successful, the total number of the records that match the user's search expression is indicated. The output may be displayed in two different forms, the brief display or the detailed display format. A help message is provided to inform the user what is displayed in these two formats.

Once the search output is displayed on the screen, the output may be browsed on the screen a record after another, saved on a diskette or printed. A help message is provide on how to save or print the output. While the output is being displayed, the total

number of the records that were retrieved are indicated as well as the record the user is viewing for instance 'Record 1 of 5'.

7.2.4 Help Features

Help messages have been provided to help the user carry out a successful search using EULOPAC. The help facilities are context-sensitive and there are directions on how to activate these help messages, and how to leave the help message screen.

7.2.5 Bulletin Board

There is also a bulletin board through which users may view some general information about the library operations, for instance, any change on the opening or closing hours, or about the information materials for instance, a list of items that have been temporarily withdrawn from the shelves and taken for binding. This would therefore save the users' time which would have been wasted through looking for documents on the shelf when they have been temporarily withdrawn. The board may also be used to display a list of titles of newly acquired documents or any other information that may be necessary for the users. This option can be activated by pressing letter **B**.

7.2.6 Patron Information

The users also have an option from main menu to view their records. This is activated by pressing letter **O** after which a screen appears prompting the user to enter the ID Number. If the user is a valid member of the library then the user's details are

displayed and he/she can view his records from the displayed information. This option would help users in various ways for instance, enable them to know when their membership is due for renewal. This facility will also help the library personnel keep users records in order, for instance, the total number of the library users and their fields of specialisation which can even be used to stock the library with the most relevant information materials. In case there is need to trace a user(s), details of their location can be easily obtained from this database. In addition, this option will also be particularly useful when all the library operations will be computerised hence interfacing the OPAC system with the other sections, for example, the circulation control system.

7.3 HOW EULOPAC SYSTEM WORKS

As has already been mentioned, the first screen the user comes across when using EULOPAC is a welcome screen.

If the user presses **F1**, an introduction on EULOPAC appears giving some information about the type of records that can be accessed through the system and provides a general advice to the users on how to go about using EULOPAC.

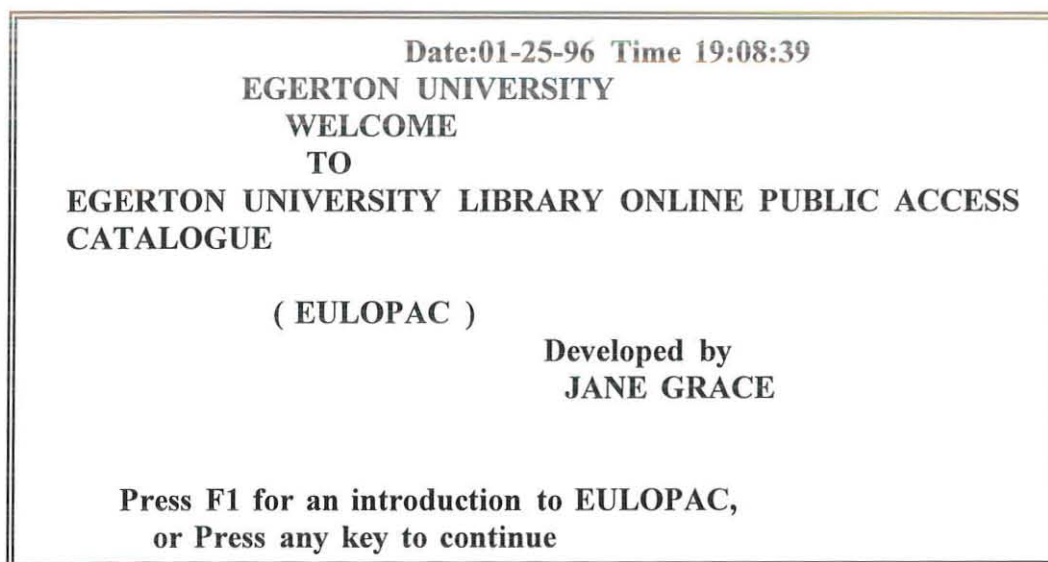


Figure 7.1 EULOPAC WELCOME SCREEN

Assuming that the user pressed any key to continue, the Search Options Menu screen appears providing a menu of various search options for the user to select.

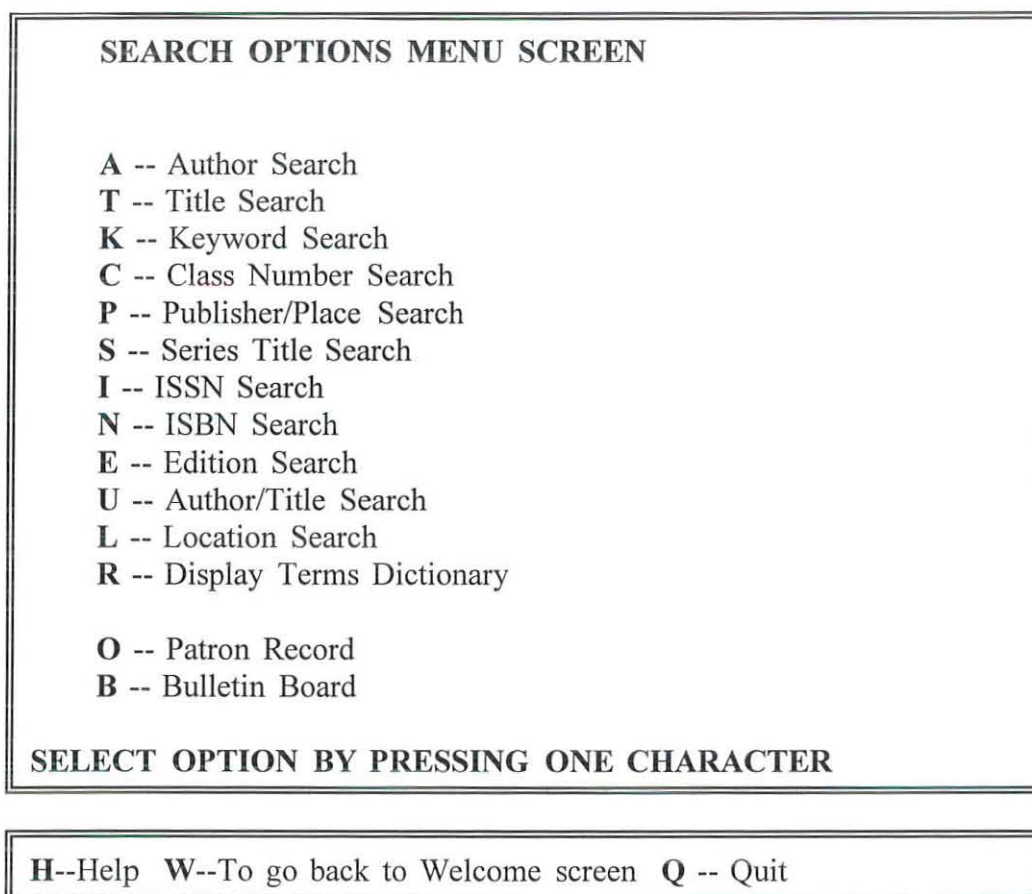


Figure 7.2 SEARCH OPTIONS MENU SCREEN

If it is not very clear to the user how to select a search option and carry out search, there is an option to get help by pressing letter **H**.

Assuming that the user has decided to do Author Search and he has pressed **A**, then the '**AUTHOR SEARCH SCREEN**' appears . The user is then prompted to enter the name of the author as shown on the screen.

AUTHOR SEARCH SCREEN

Enter Author Name and press enter

Press **F1** for help, or **ESC** to go back to Menu Screen

Figure 7.3 SEARCH SCREEN

If the user knows how to enter the author name, he can proceed with the search. If the user does not know how to conduct the author search, he can press **F1** to get the help message on author name search. Otherwise, if he does not want to perform any author search he can press **<ESC>** to go back to the main menu.

Assuming that the user has entered the name '**Curwin**', search will be conducted and if the search is successful, then a screen appears indicating the number of records found matching the search term.

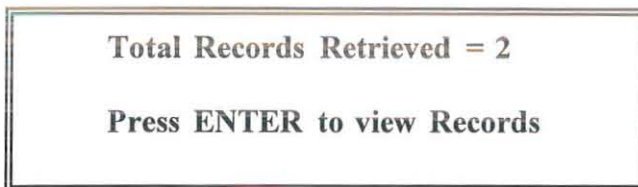


Figure 7.4 Number of Records Retrieved Screen

After the user has pressed **ENTER**, the display screen appears and the user is asked to select one of the display formats for either brief or detailed display.

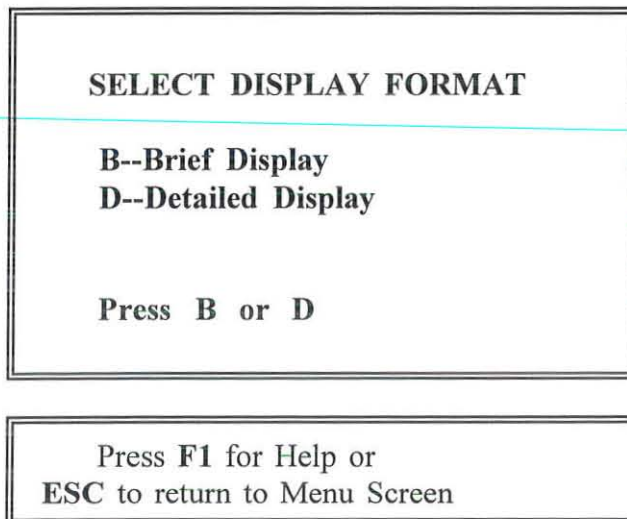


Figure 7.5 THE DISPLAY FORMATS SCREEN

If **F1** is pressed at this stage, a message appears giving the user information on what details are provided by each format.

Assuming that the user has pressed letter **D** for detailed display, a record like the one shown in the following screen appears.

Record 1 of 2 Quantitative methods for business decisions / by Jon Curwin ; Roger Slater . - Berkshire, Eng. : Van Nostrand Reinhold, 1985. Vii, 345p. : illus. ; 24cm. HF 5691.C87 Includes index C.3 Main Library ISBN 0-442-30640 : Donated
More -- Y/N ? [S]ave [P]rint F1 for Help

Figure 7.6 THE OUTPUT DISPLAY SCREEN:

If the user pressed **F1** a help message appears on how to save the output, print it or just browse on the screen.

If letter **P** is pressed, then the output on the screen will be printed. If letter **S** is pressed, the output is saved on a floppy diskette. If the user presses **Y** for more records to be displayed, then the next record is displayed. If the user presses **N** then the Search Options Menu screen appears from where the user can carry out another search or exit. If the user has pressed **Y** yet the last record has already been displayed, then a message appears telling the user that it is the end of records display.

End of Display. Press ANY KEY to continue

Figure 7.7 End of Display Message Screen

If the Enter key is pressed then the 'Search Options' screen appears.

Otherwise if there are no documents authored by 'Curwin' ie the search expression 'Curwin' was not successful, then a message appears telling the user what to do as indicated in the screen that follow.

Search term **Curwin** /(100) does not exist in the database. Press **ANY KEY** to return to the main Menu and try again

Figure 7.8 Failed Search Expression Screen

On pressing **ANY KEY**, the Search Options Screen appears, and the user may press same letter **A** or any other letter for another search, or press **Q** to quit.

7.4 SUMMARY

EULOPAC was developed keeping the users' requirements and the recommended desired features, discussed in chapter 6, in mind. In brief, the system provides the following features.

- Records in the database according to MARC and AACR2 formats;
- Easy to learn Menu-Driven interface;
- Search interface in English language;
- Two way communication between the user and the system;
- An Inviting first screen which also identifies the library;
- Indicates where the user is at every stage.
- Various access points for searching (see section 7.2.2);
- Truncation facilities;
- Boolean operators;

- Terms dictionary search facilities;
 - Brief and Detailed display formats;
 - Indicate total number of records retrieved;
 - Retrieved records contain copy location information;
 - Printing facilities;
 - Saving facilities;
 - A list of titles of newly acquired items and/or temporarily withdrawn items; and,
-
- Context-sensitive help facilities at every stage.

However, due to time constraint, some of the desired features could not be achieved. These include:

- Databases for some non-book materials, for instance, music and films could not be developed;
- System cannot provide a search history;
- System cannot differentiate between best and partial matches;
- The system cannot give automatic help for repeated mistakes;
- The system cannot produce statistical reports;
- Only locally stored databases can be searched; and
- No authority control file could be developed for reference during database design.

CHAPTER EIGHT

STRATEGY FOR IMPLEMENTATION OF THE PROPOSED OPAC

8.0 INTRODUCTION

According to the requirements discussed in Chapter 6, it is recommended that a local area network (LAN) be set up at Egerton University networking the Main Library, FASS, Utafiti and CWSGA libraries. A central computer system should be maintained in the Main Library and various terminals provided both within the main library as well as in the other libraries to make use of the OPAC.

In the initial stage of the system implementation, stand alone computers should be installed at Kisii and Laikipia libraries. These libraries should create and maintain their own bibliographic databases. Records of items purchased directly by these libraries should be downloaded into diskettes and tapes which will be subsequently uploaded to the main or central database at the Main library. Otherwise, materials purchased through the main library should be processed at the main library, and their records are to be transferred to the branch libraries in the same manner.

This chapter discusses some basic strategies to be followed for implementation of the proposed Egerton University Library Online Public Access system, EULOPAC.

8.1 SOFTWARE CONSIDERATIONS

For the implementation of the proposed system, various software packages have been suggested as shall be seen in the following subsections.

8.1.1 Operating Software

The recommended operating software for the proposed system is the MS-DOS. According to the vendor survey results presented in Chapter 5 section 5.3, this software is available in Kenya.

8.1.2 Application Software

Two software packages have been considered for the proposed OPAC system, TINlib, and the Micro CDS/ISIS software packages.

8.1.2.1 TINlib

TINlib is an integrated library management system developed by Information Management Engineering Ltd in UK and supplied by IME (Information Made Easy). This software has been recommended for the proposed system due to various desirable features including the following.

TINlib has powerful online catalogue features as has been described in Chapter 4 section 4.5.1.9. In addition, it has very flexible database design features including the following (Manson 1989) :

- It allows creation of records of variable field length and indefinitely repeatable fields;
- It has integrated search and edit functions that allow editing of fields within the record creation mode, without having to quit data entry and go back in via an edit function;
- It provides interactive windowing facilities, whereby windows are used to display information such as authority lists without overwriting data on the current screen being worked on.

TINLib software is also compatible with the Proposed MARC format. It even has a MARC interface that enables it to offer standard MARC conversions from down loaded files. It does this through its powerful import/export facilities (Manson 1989).

In addition, TINlib is composed of a full suite of library modules which are well integrated (Larsen 1992), as indicated in Chapter 4 section 4.5.1.9. This is a desirable feature for the proposed system which might have to be integrated with other library sections in the near future, when all the library operations will be computerised.

This software has been installed in Moi university as has been discussed in Chapter 2 section 2.3.2. Therefore, installation of this software in Egerton University

Library system will ensure compatibility of computer systems and hence would facilitate resource sharing between the two Universities.

8.1.2.2 Micro CDS/ISIS

CDS/ISIS (Computerised Documentation Systems/Integrated Set of Information Systems) software package available at SISA was used to demonstrate how the proposed system may work. This software is produced and distributed by UNESCO to non-profit making organizations free of charge, after signing an agreement in the form of contract (Nieuwenhuysen 1991). CDS/ISIS is a generalised information storage and retrieval system, designed for the storage, processing and retrieval of structured non-numerical databases with records of fixed or variable lengths.

Micro CDS/ISIS software has some desirable database design features, including:

- Its support for the creation of records of both variable and fixed length fields.
- Its powerful search capabilities via an index in form of an inverted file, as well as search using the boolean and proximity search operators (Nieuwenhuysen 1991).
- The CDS/ISIS version 3.07 is networkable and hence allow users to access CDS/ISIS files on a network for searching purposes as long as they are marked as sharable (Hopkinson 1991).

As was indicated in Chapter 2 section 2.3.2 the software has been widely implemented in information systems and libraries in Kenya. In addition, as was mentioned in chapter 3 section 3.3.3.2, one of the Egerton University's libraries, Utafiti Library has already installed this software (CDS/ISIS version 3.07). Therefore, if the proposed system were to be implemented using this software, this would have ensured compatibility of the computer systems and hence information resource sharing between the libraries.

Unfortunately, CDS/ISIS does not support integrated library operations such as cataloguing, OPAC, circulation control, acquisition and serials modules (Bhargava 1993). This might therefore pose a problem in the near future when all the library operations need to be computerised and integrated. However, during the study, it was learnt that two software packages LAMP and SANJAY which are compatible with CDS/ISIS have been developed in India and Netherlands respectively.

LAMP (Library Automation and Management Program) is an integrated library automation software developed by the Netherlands Library Development Project (NLDP) in collaboration with the Pakistan Library Association (PLA). This program has modules for acquisition, circulation, and cataloguing for both monographs and serials. It also has many other utilities which are all totally menu-driven hence easy to use (E- Mail communication with Riaz Khan).

SANJAY is a library automation software developed in the CDS/ISIS environment, by the National Information System for Science and Technology (NISSAT) of India using the pascal interface. SANJAY is an interactive, menu driven, and user

friendly package which carries out routine functions of the library including acquisition, circulation, and cataloguing and has an online catalogue interface. This package has more flexible database design features and supports relational databases, unlike CDS/ISIS.

TINlib software is considered a better choice for the library automation project. However if the library decides to install CDS/ISIS based software for compatibility with other information system, then the CDS/ISIS based library management packages may be considered.

8.1.2.3 Other Necessary Software Packages

Other software packages required to support implementation of the proposed system include, Word processing software package for instance, WordPerfect version 5.1 software for text typing purposes and a statistical package such as SAS or SPSS/PC+ for generation of statistical reports. Some utility package is also required for formatting diskettes, clearing viruses and checking bad sectors in diskettes.

8.1.3 Network Software

A network software is required for the campus LAN to network the libraries within the main university including the Main Library, FASS, Utafiti and CWSGA libraries. The recommended networking software is Novell Netware. The survey results on computer vendors presented in Chapter 5, indicated that this software is available and can be purchased in Kenya. This software is compatible with the two software packages suggested in section 8.1.2.

8.2 HARDWARE REQUIREMENTS

8.2.1 Computer System

The hardware required to implement the proposed system must be compatible with the proposed software packages. Microcomputer systems, IBM or IBM compatible are recommended for the system. According to the survey results on computer vendors presented in Chapter 5, Section 5.3, these computers are available and can be purchased in Kenya. Installation of such systems will ensure compatibility with the already installed computers in Egerton University's Utafiti library as well as the other computerised libraries in the country and hence facilitate information resource sharing.

8.2.1.1 Computer Storage Capacity

The total collection of Egerton university library system's book, periodical and reports is about 128,356. The average length of a book record in machine readable form (ISO format) is about 560 characters which is equivalent to 560 bytes (calculated from the sample records created and discussed in chapter 7). Giving the same amount of storage space for the accompanying indexed files, we can assume that a book record will require about 1120 bytes of storage space in a computer.

Therefore, the 128,356 records will require about (1120×128356) 1,437,587,20 bytes or 143.75 MB storage space to convert the current card catalogue to machine readable form. Giving an allowance storage space for storing the various software

packages needed, a server of at least 500 MB disk storage capacity is recommended to start off the proposed system.

However, more storage capacity will be needed as the library collection grows. According to the projected expansion plan of Egerton University (Egerton Univ. Dev. Plan 1994-2004), the library system intends to have about 1.7 million books by the year 2004 (eight years from now) (section 3.4 in Chapter 3). This means the library system will require about 1,904 million bytes or 1,904 MB (1.7m x 1120) of storage space for its current collection and some allowance for growth, assuming a steady growth rate in line with the plan.

8.2.1.2 Terminals

Microcomputer terminals are required for staff at the cataloguing sections for creating the databases. Judging from the sizes of the libraries as discussed in Chapter 3 section 3.3, we can assume that at least 11 terminals should be provided for this purpose. Four at the Main library, 3 at Laikipia, 2 at FASS, 1 at CWSGA and 1 at Kisii. VDT (Video Display Terminals) will be required to access and search the database. To allow enough space for records retrieved by users during search sessions, terminals of at least 1 MB are recommended. A minimum of at least 16 terminals is recommended for online searching by the users: 6 at the main library, 3 at FASS, 2 at Kisii, 4 at Laikipia and 1 at CWSGA libraries to begin with.

A terminal with a screen size of at least an 80-column by 24 line display is recommended to allow an adequate amount of data to display. Soft scrolling should occur when a 25th line is written at the bottom of a filled screen.

A keyboard with standard layout of symbols and characters is recommended.

Symbols like slash, equal sign, 'at' sign and special keys like break, escape, control and carriage return should be located in the usual position. Ill designed keyboards, for instance, those having "break" key where the "shift" key would normally be, should be avoided.

8.2.2. Printers

Printers are required to enable the library staff and users print their search outputs.

For a start, it is recommended that at least one printer be provided for every two terminals. However, it is ideal to have a printer for each terminal. Therefore, each terminal should be designed in such a way that it has provision for a possible addition of a printer, for instance, have printer ports for possible direct attachment to the printer. Thermal printers are recommended since they make very little noise if any, compared to the impact printers.

8.2.3 CD-ROM Drives

At least 5 CD-ROM drives are required for the Main Library, FASS, Laikipia, Kisii and CWSGA libraries. Utafiti library already has one. This would help provide online search to databases on optical disks.

8.2.4 Other Peripherals

Diskettes, magnetic drives and tapes are also required for back-up copies of the databases and off line storage of some files. Cables are also required to connect the terminals to the central computer system.

8.2.5 Furniture

Tables are required for placing computer terminals. These tables should be large enough to allow space for placing and/or using the reference manuals if need be.

Adjustable swivel chairs with ergonomic features are recommended. The user should be able to adjust a chair when necessary for different heights, seat depth, and firmness of back.

8.3 LOCAL AREA NETWORK (LAN) TOPOLOGY

For the proposed LAN within the University's Main campus, a star network topology is recommended, whereby all the terminals or nodes will be directly connected to the central computer system in the main library. This structure is quite suitable as a device failure at one node cannot disable the entire network.

8.4 PHASES OF IMPLEMENTATION

8.4.1 Hardware and Software Acquisition

Before acquiring hardware and software a request for proposal(RFP) specifying the library System's requirements mandatory and desirable features should be prepared and sent to all possible suppliers or vendors. Once the proposals from the vendors are received, evaluation of the facilities they offer should be done.

Invitation to Tender (ITT) should be sent to selected suppliers to set price to suppliers' proposed solutions. Tenders should then be evaluated and recommendations formulated.

If the option of purchasing the TINLib software package is taken, the library should organise for a visit to Moi University to check on various features. The library personnel should prepare in advance a checklist of requirements to be field tested. This checklist should include the login and logoff procedures, search facilities, output facilities, help and or error messages features, any possible problems faced by the Moi university personnel in running the system and how they go about solving them, whether, they get any support from the supplier, the annual maintenance cost, etc. This checklist approach also advocated by Victoria O'Rourke (1987), is very useful as it helps the personnel to evaluate the features in real working situation.

During purchase of the system, it might be necessary to sign contracts with the chosen supplier. Since the library does not have a legal affairs office, it would be

necessary to use a consultant experienced in online catalog installations. The University lawyers should also be consulted to highlight on the various legal issues of the contract. Contacting other libraries that have had online installations and looking at their contracts is also recommended.

The library administration should understand and verify each clause, especially, the ambiguous ones. It might be a good idea to add a section to the contract that defines the terminology that the library and/or the vendor does not understand.

8.4.2 Funds for the Proposed System

After estimating the costs and final decision has been reached on type of system to install, funds should be solicited from the University. If funds from the university are not adequate, the library should approach donor agencies who may be willing to finance the project. If the later option is taken, the grant application or proposal should be prepared clearly stating the needs and objectives of the proposed system.

Before installation, the site where the system would be installed should be prepared. For instance, the central computer system requires a separate and secure room. Other issues to be addressed include ensuring that adequate lighting and cabling systems are installed, and computer tables put in place. Once the hardware and the software have been installed, testing of the same should be done to ensure that all equipment are in good condition and are well integrated with the software packages installed.

8.4.3 Manpower Development

The library staff should be trained on computer applications and in particular, how to work with the new computer system. The staff can be trained in the academic institutions mentioned in Chapter 2 section 2.3.5 which offer various computer-technology courses. The survey results revealed that some computer vendors also offer some training.

It is recommended that the few library staff who already have some knowledge in computer technology be trained first, and have them serve as resource personnel to train the rest of the staff members. Training of staff should take place parallel with the installation of the system so that once installation is complete, the staff are also ready to start using the system.

8.4.4 Database Creation

If testing of the system is successful and the staff have been trained, the necessary databases should be developed. The structure of database creation discussed in Chapter 7 is recommended for creating the bibliographic databases.

Conversion of data might be a very expensive exercise since the library does not have any of its catalogue records in machine readable form. Therefore, before starting this activity, the library should extensively weed the collection to reduce the number of titles that must be converted and hence reduce the costs. Weeding of the materials should be preceded by a use study of the materials so that valuable materials are not discarded.

Data base creation involves record creation of new items as well as retrospective record conversion of the card catalogue into machine readable form. Retrospective conversion can be done in various ways including the following;

- Full local record entry in MARC form through the keyboard. Older materials especially those that were classified using, Dewey Decimal Classification scheme for instance, the Kisii campus library records have to be reclassified using the LC classification system. This is necessary to ensure compatibility of the machine readable record format hence facilitate easy exchange of information materials.
- Make use of the various collections for instance use of the MARC records by searching and downloading relevant records from CD-ROM databases, adding only copy and holdings information on the located records.
- Contract keying method which involves entering into a contract with one of the keyboarding services to convert the libraries shelf list. The library should photoreproduce the catalogue cards and take them to an agency that will have the catalogue cards keyed into machine-readable form, and converts the text strings into USMARC format records.

Full local record entry seems to be more appropriate since it is cheap in terms of price though it consumes a lot of time.

However, the library should evaluate these options and select the most appropriate one depending on the financial status.

8.4.5 User Training

Once the system has been installed and ready to start operating, the users of the system should be trained on how to use the system. According to survey results in Chapter 5, at least 49.2% of the users already have some computer knowledge. This makes training of users easy.

To create awareness about the computer system, newsletters may be used and demonstrations organised to demonstrate how to carry out online searches, emphasising on the facilities offered by the system.

8.4.6 System Change Over Approach

The recommended approach for system change over from the manual to computer based system are as follows:

8.4.6.1 Phased Approach

The whole project should be divided into three major phases. The first phase should be installation of the system in the Main Library including its LAN within the library. Once this is complete and working successfully, the departmental and branch libraries should install their systems. The third phase is the recommended campus network networking all the libraries within the main university. Once this network is

working satisfactorily, then networking other University departments with computers and wishing to be connected to the library network should be undertaken.

8.4.6.2 Parallel Running Approach

Both old (card catalog) and new system should be operated in parallel for a period of time until it has been proved that the new system works satisfactorily.

8.5 SYSTEM MANAGEMENT AND MAINTENANCE

Proper management and maintenance of the system is imperative for the system to offer reliable services.

8.5.1 Documentation

For proper maintenance of the system, good documentation should be provided. This will include :

- **Reference Manuals**

These should include at least an alphabetic listing and short description of important system commands, parameters, data elements, and error messages; instructions on how to switch on and off search terminals; and a brief description of what materials are included in the catalogue database.

There should be a step by step guide or brief description that gives a conceptual model of how the online catalog works and how the database should be created.

8.5.2 Security of the System

There should be policy measures that will strengthen the security of the computer system and the data it contains. Security policies should take into consideration the following issues :

- Stating the possible risks which the system is exposed to, and assessing the probability of each occurring and the consequences, then develop disaster and contingency plan that specifies the duties and responsibilities of various personnel in the event of an emergency. For instance, have detailed notification procedures indicating who calls whom in case of an emergency, like fire.
- There should be written backup procedures for the backup storage of programs and supplies for instance, stating how frequently backup should be made. Back up copies of the database, should be stored in a remote, secure location so that when there is catastrophic power failure, the data will be preserved.

- There should be detailed plan for removal of critical documents disk packs, tapes, and documentation if necessary.
- There should be effective access control measures to:
 - control access to documentation and working papers such as computer programs and operating system so that they can only be accessed by authorised individuals and are locked away when not in use.
 - control access to the room where the server is installed. Only authorised people should be allowed access to this room.
 - access control to confidential data in the systems through passwords, user IDs and data encryption. For instance, only authorised staff should be allowed to access the cataloguing applications and/or update the catalogue database. Passwords should be changed at random intervals.
- There should be adequate fire fighting appliances including smoke and heat detection alarms. In addition, appropriate fire regulations should be set. For instance, there should be a direct line to the fire station.
- Uninterruptible Power Supply (UPS) is also required to alleviate the problem of unstable electricity. Voltage stabilisers and spike controls will also be required.

8.5.3 System Supervisor

It is recommended that a full-time computer supervisor or manager be employed to supervise the operations of the network. The duties of such a supervisor would include:

- Inspection of the terminals and network cabling and ensuring that there is constant supply of spare parts of vital devices. These items should be regularly checked to make sure they are operable on demand.
- Monitoring the network operations and performance, making or recommending any necessary adjustments.
- Database management including regular taking of back up copies of the databases.
- Ensuring that disks and tapes containing back up copies are uniquely labelled to prevent overwriting or erroneous deletion of files.
- Providing necessary manuals or any documentation needed by the users.
- Organising user-training and orientation especially for new staff and students.

CHAPTER NINE

CONCLUSION AND RECOMMENDATIONS

9.0 CONCLUSION

Information is very vital for development of any nation or country. Easy access to information is therefore of utmost importance. To provide timely and easy access to relevant information materials and hence information, is almost impossible without the assistance of IT. This study was undertaken with an aim of proposing an OPAC system that will facilitate easy access to the information materials of Egerton University Library System.

To propose an appropriate OPAC system and an appropriate implementation strategy, analysis of Egerton University Library System in terms of its structure and the functions carried out in the various library sections, with particular emphasis on the catalogue and the process of cataloguing was done. In addition, questionnaire and interview surveys were carried out to determine the shortcomings of the manual card catalogue and the various types of problems faced by the users as well as the library personnel when using the catalogue.

Analysis of the Library system as presented in chapter 3 and the survey results presented and analyzed in Chapter 5, revealed that there are various problems faced by the library users and staff while using the manual card catalogue system.

From the analysis of the survey results, it was obvious that there is need to computerise the system. Therefore, user requirements were defined and desired features of the proposed system were formulated.

A survey of the services offered by computer vendors in Kenya was also carried out and analysis of the results indicated that various computer hardware and software are available in Kenya. It was however revealed that, no commercial software packages specific to library housekeeping operations are sold in Kenya.

Following the defined requirements and desired features presented in Chapter 6, a prototype OPAC system EULOPAC, was developed to demonstrate how the proposed system should work. An integrated prototype database (OPAC) was designed for monographs, serials, reports and cartographic materials. A prototype program module was also developed to demonstrate how the desired and recommended features may be implemented. Some basic strategies for implementing the proposed EULOPAC system were formulated and recommended in chapter eight.

In brief, this study has given enough insight to arrive at the following conclusions:

- Library automation is of absolute necessity;
- Implementation of an OPAC is the first step towards the library automation.
- Standardisation in the process of cataloguing is necessary;
- Egerton University libraries should use MARC bibliographic format;

- Users' problems in accessing the manual catalogue could be solved by developing a user-friendly interface for the OPAC with sufficient online context-sensitive help;
- Though Micro CDS/ISIS has been used to demonstrate how the OPAC should be, TINlib software could be a better choice for the library.
- There is need to develop various bibliographic databases for the various bibliographic materials held in the libraries.

9.2 RECOMMENDATIONS

From the research findings and analysis, it is recommended that an OPAC system be implemented at Egerton University to enhance easy and timely access to information.

In line with the research findings, it was recommended that a bibliographic database is a prerequisite for the proposed system. MARC format and AACR2 were recommended for the creation of the required bibliographic databases. TINlib software was recommended as a possible software package for the implementation of the proposed system.

9.2.1 Desired Features

Various desired features were recommended for the proposed system. However, some of these features were not developed in the prototype system. It is therefore recommended that these features be developed if the proposed system has to solve the

9.2.3 Local Area Network (LAN)

In the event of computerising the other library operations, a LAN should be installed networking all the library sections. This will enable EULOPAC offer even more services for instance, it would be possible to tell through the OPAC whether a book is borrowed or still within the library.

9.2.4 Wide Area Network (WAN)

The study also revealed that, information resources can not be adequately shared among the Egerton University libraries due to the long distance between these libraries. Therefore, these libraries should all be computerised and a WAN installed, networking these libraries as this will enhance information sharing. Such an implementation should be preceded by a requirements analysis of the proposed WAN, to determine the volume of data transfer. Adequate knowledge about the cabling system and the data communication protocols held by the Kenya Posts and Telecommunication Company (KP&TC) should be sought. The type of communication software should also be considered.

9.2.5 System Review and Evaluation

Once the system has been successfully installed and has started operating, procedures for system evaluation should be developed. Evaluation of the system should be performed periodically for instance twice or at least once a year, in order to evaluate and determine whether the system is meeting the requirements of the users, and hence

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APPENDIX I

A. USER SURVEY QUESTIONNAIRE

Egerton University
Library Department
P.O Box 536
Njoro
5.7.1995.

Dear Sir/Madam,

I am a graduate student in the School of Information Studies for Africa (SISA), at Addis Ababa University, Ethiopia. I am currently carrying out a research on an Online Public Access Catalogue (OPAC) with specific reference to Egerton University's Library catalogue. This questionnaire which is part of the research, is aimed at ascertaining the library users' needs. I kindly request you to fill the attached questionnaire form and return it to me, or leave it in the Main University library by 20.8.1995.

Thanking you in advance for your assistance.

Yours faithfully,

Jane Grace Kidei

Instructions:

Please answer the questions by writing or typing on the spaces provided and ticking in the brackets (()) where necessary. Indicate N/A for 'not applicable' if the question does not apply in your case.

Section A:

Personal identification data

1. Fullname :
2. Nationality:
3. Age () 17 - 25 () 25 - 35 () 35 - 45 () 45+
4. Mailing Address Telephone: Home (optional)
-
- office.....
- Telex:
- Fax:

5. Educational Qualification:

Awarding Institution

- Certificate:
- Diploma:
- Degree:
- Other (please specify)

6. Language Ability: (You can tick more than one if applicable)

- | | Read | Write |
|-----------------|-------|-------|
| English: | () | () |
| French | () | () |
| Kiswahili: | () | () |
| Other (Specify) | | |

7. Current Status (Tick where appropriate)

- () Student () Lecturer () Researcher () Administrator
- Other (please Specify).....

8. Work Experience:

Place of work (if not Egerton University) :

Type of work

Position:

9. What is your field or subject of specialization or interest?

Major

Other

Section B:

Information needs and services:

10. Is there any information centre or library in your institution or department?

Yes () No ()

11. Of what importance to you and your work is the information centre?

() Extremely important () Moderately important

() Very important () Of no importance

12. How often do you visit the library?

() Once a week () More than once a week

() Once in a fortnight () Never

13. For what purpose do you visit the library ? (You can tick more than one place if necessary).

() To read and borrow books

() Make literature searches using abstracting and indexing journals

() Consult current journals to keep a breast with development in your field/subject

() Make reference inquiry

() Read newspapers, magazines etc.

() Read your own notes

() write a paper, prepare lecture notes

() Other (please specify)

14. If the answer to question 12 is never, please briefly explain why you don't visit the library
15. Do you visit other information centres ?
() yes () no
16. If yes, for what purpose ? Briefly explain.
17. What type of information do you need to meet the specific requirements in your field of specialization?
() theoretical () experimental () processing methods
Other (specify).....
-
18. How do you keep yourself up to date in your field of specialisation ?
() Through current awareness services, newsletters, bulletins
() Scanning latest periodicals and books on display
() Through discussions and/or seminars, and/or correspondence
() Consult librarians for information
() Other (specify)
19. When you want to know whether a particular document is within the library or not, what do you do?
() Go browse through the library catalogue
() Talk to the reference librarian
20. When looking for information in your library who does the searches ?
() yourself
() yourself with the help of the library staff
() the library staff
21. If you do the searches for yourself what/whom do you consult?
() The card catalogue () Look for the documents on the shelves
() The reference librarian
Other (Please specify)

22. If you consult the card catalogue how often do you do so?

☐ every library visit ☐ very often ☐ Rarely ☐ Never

23. When you consult the card catalogue what access points do you use? (Tick the one you use most.)

☐ Author ☐ Title ☐ Subject

☐ Class number

Others (specify)

24. Do you face any problems when consulting the catalogue ?

☐ Yes ☐ No

25. If yes what type of problems

☐ It is hard to know in advance, the specific author

☐ It is hard to know in advance, the specific title

☐ It is hard to Know the class number of the document

Other (briefly explain)

26. When you get such a problem as indicated above, what do you do?

☐ Get help from the person next to me.

☐ Get help from the library staff.

☐ Get no help just leave without the information needed.

27. What in your opinion would you say about the catalogue?

☐ upto date ☐ out dated ☐ extremely outdated.

28. When you do searches how do you prefer the information presented ?

☐ Full - length or original document

☐ Abstract (summary of original document)

☐ Graphical or Tabular form

☐ Other (please specify)

29. What type of communication channels or media do you prefer when looking for information?

☐ E-mail ☐ Telephone ☐ Fax ☐ letters

30. What would you say in your opinion about the services provided by the library.

They are;

☐ Adequate, ☐ inadequate

☐ Timely ☐ Untimely

Other (Please specify)

31. How do you think this problem can be solved ?

.....

.....

32. Is there anything else you would like to say about the services rendered by the library

.....

Section C:

Computer Knowledge:

32. Have you ever used a computer?

☐ yes ☐ no

33. If yes to the above, where?

☐ computer department ☐ office ☐ at home

☐ other (specify)

34. For what purpose do you use the computer?

.....

35. What software packages are you familiar with?

☐ CDS/ISIS ☐ MINISIS ☐ dBase

☐ Word processing software

Other (please specify)

36. Have you ever used on-line search services before?

() Yes () No

37. If the answer to 36 above is yes, please state where.

.....

38. How in your opinion do you think a computer based database (catalogue) will improve the services rendered by the library?

Thank you for your cooperation.

B. DISCUSSION GUIDE FOR INTERVIEWS WITH THE LIBRARIAN

1. When was the library established?
2. Name of the sponsor?
3. What are the current sources of finance?
4. What are the objectives of the library?
5. What are the main functions of the library?
6. What type of information materials are held in the library?
7. What is the total collection?
8. Is the library collection accessible for consultation to outsiders for bonafide study?
9. Does the library engage in interlibrary lending services with other institutions? If so which Institutions?
10. What is the total number of the library users?
11. What is the present cataloguing system?
12. What is the total amount of money spent per annum on the present cataloguing system?
13. What is the total number of the staff and what are their qualifications?
14. How does the library share its resources with the branch and departmental libraries?
15. Are there information materials present in the main library and not in branch libraries? If so how do the users in the branch libraries get to know about these materials?
16. What plans do you have for the future?

APPENDIX II

A. COMPUTER VENDORS SURVEY QUESTIONNAIRE

1. Name of the Organisation
Address
Telephone
Fax
2. When was the firm/company established?
3. Is the company a subsidiary or an agent of another company?
.....
4. If yes to number 3, name the parent organisation and the place of its location
.....
5. What services does your company offer?
 - a). Sale of Hardware () d). Sale of Hardware spare parts ()
 - b). Sale of Software () c). Consultancy services ()
 - c). Others (Please specify)
6. What type of computers do you market in Kenya?
 - a). Mainframe () b). Minicomputers ()
 - c). Microcomputers ()
 - d). Others (please specify)
7. Is the computer hardware you sell imported as a whole or assembled in country?
.....
8. What software packages do you sell? Please enumerate, indicating their prices
.....

9. What types of computer hardware in terms of model, operating system, disk capacity do you sell? Please indicate their prices
10. What peripherals do you sell? Please tick where applicable and indicating their prices.
- | Type | Price |
|--------------------------|-------|
| Printers | |
| Magnetic Tapes | |
| Magnetic Tape Drives | |
| Diskettes | |
| Others (Please specify) | |
11. Do you provide installation and maintenance services to your clients?
.....
12. Do you provide training services? If yes what type of training and at what cost?
- | Type | Cost |
|-------|-------|
| | |
| | |

B. LIST OF THE COMPUTER VENDORS SURVEYED

1. Abaws Computer Systems Ltd.

P.O Box 38988 Nairobi, Kenya

Tel. 440999/443021 Fax 254-2-444806.

2. Data Centre Limited

P.O Box 30286 Nairobi, Kenya

Tel. 333491 Fax 254-02-219400

3. Datasolv Limited

P.O Box 73169 Nairobi, Kenya

Tel. 749582/750184 Fax 254-02-75169

4. Nakuru Computer Centre

P.O Box 961 Nakuru, Kenya

Tel. 44350 Fax 40770

APPENDIX III

LIST OF NAMES OF PEOPLE WHO PROVIDED INFORMATION

1. Mr. Bernard Githua. Egerton University, Box 536 Njoro.
2. Ms. Betty Wambui. Laikipia Campus, Box 1100 Nyahururu.
3. Miss. Doris Chelagat. Egerton University, Box 536 Njoro.
4. Mrs. Dorcus Tunya. Egerton University, Box 536 Njoro .
5. Mr. Eli Karani. Egerton University, Box 536, Njoro.
6. Mrs. Grace Magu. Egerton University, Box 536 Njoro.
7. Mr. Gerald Makau. Egerton University, Box 536 Njoro.
8. Mrs. Janet Kangatta. Laikipia Campus, Box 1100 Njoro.
9. Mr. Job Kipkebut. Egerton University, Box 536 Njoro.
10. Mr. Joseph Mwangi. Egerton University, Box 536 Njoro.
11. Mr. Leonard Omwesi. Kisii Campus Box Kisii.
12. Mrs. Mable Asiko. Egerton University, Box 536 Njoro.
13. Miss. Margaret Chepchumba. Laikipia Campus, Box 1100 Nyahururu.
14. Miss. Millicent Ong'ondo. Egerton University, Box 536 Njoro.
15. Miss. J. Miller. Laikipia Campus , Box 1100 Nyahururu.
16. Mr. Mogere J.K. Box 122 Kisii.
17. Mr. Njoroge. Moi University, Box 3900 Eldoret.
18. Mr. Nyongesa K. Laikipia Campus, Box 1100 Nyahururu.
29. Mr. Raymond Ongus. Egerton University Box 536 Njoro.
20. Mr. Samuel Muthai. Laikipia Campus, Box 1100 Nyahururu.

21. Mr. Samuel Mile. Laikipia Campus, Box 1100 Nyahururu.
22. Mr. Samuel Abudho. Egerton University, Box 536 Njoro.
23. Mr. Shadrack Bilindi. Egerton University, Box 536 Njoro.
24. Mr. Shem Khamadi. Moi University, Box 3900 Eldoret.
25. Mr. Sylvester Otenya. Egerton University, Box 536 Njoro.
26. MR. Tanui. Moi University, Box 3900 Eldoret.
27. Mr. Wanyama. Laikipia Campus, Box 1100 Nyahururu.
28. Miss. Njuki M. Egerton University, Box 536 Njoro.
29. Miss. Yudita Mwandagha. Egerton University, Box 536 Njoro.
30. Miss Matele J. Egerton University, Box 536 Njoro.

APPENDIX IV

USERS DATABASE (USEROP) STRUCTURE

A. FDT for the users database

Tag	Name	Length	Type	Rep	Delimiter/Pattern
001	Name	25	A		abc
002	Sex	2	A		
003	Age	2	X		
004	Status	50	X		abc
005	ID Number	15	X		
006	Address	100	X		abcd
007	Department	35	A		
008	Course	50	X		abc
009	Hall of Residence	20	X		ab
010	Date of Registration	10	X		dd-mm-yyyy
011	Membership Expiry Date	8	X		mm-yyyy
012	Loan Limit	2	X		

B. Data Entry Worksheet for Users Database

Name (001): -----

Sex (002): -----

Age (003): -----

Status (004): -----

ID Number (005): -----
Address (006): -----
Department (007): -----
Course (008): -----
Hall of Residence (009): -----
Date of Registration (010): -----
Membership Expiry Date (011): -----
Loan Limit (012): -----

C. FST for Users Database

ID	IT	Data Extraction Format
1	4	MHL, V1^c
4	4	MHL, V4
5	0	MPL, V5
6	4	MHL, V6
7	4	MHL, V7
9	4	MPL, V9^a

D. Display Format for the Users Database

MFN/MHL, "User Name : "V1/"Sex : "V2/"Age : "V3/"Status : "V4/"ID Number : "V5/"Address : "V6/"Department : "V7/"Hall of Residence : "V8/"Course : "V9/"Date of Registration : "V10/"Membership Expiry Date : "V11/"Loan Limit : "V12/

APPENDIX V

BIBLIOGRAPHIC DATABASE (OPAC) STRUCTURE

A FDT for the Bibliographic Database

Tag	Name	Len	Type	Rep	Delim/pattern
001	Accession number	15	X		
005	Fiction Indicator	1	N		
007	Intellectual level code	1	A		
008	Date of Entry	10	X		dd-mm-yyyy
006	Relief code	4	X		
009	Base map elements code	3	X		
020	ISBN	15	X	R	
022	ISSN	10	X	R	
027	STRN	10	X		
034	Coded mathematical data	20	X		
39	Bibliographic level	2	X		
041	language code	3	X		
050	Call number	20	X	R	
051	Copy/issue	5	X		
086	Government Doc. Number	10	X		
088	Report number	10	X		
100	Author name	200	X	R	abcd
101	Compiler	200	X		abcd
110	Corporate name	300	X	R	ab
111	Conference	300	X		acd
210	Abbreviated Title	10	X		
240	Uniform title	500	X		
245	Title Statement	500	X		ab
247	Former Title	500	X		
250	Edition	300	X	R	ab
255	Mathematical data area	100	X		
260	Imprint	300	X	R	abc
263	Projected Publication Date	10	X		
265	Source	100	X		
300	Collation	200	X	R	abc
310	Frequency	30	X		
321	Former Frequency	30	X		
350	Price	20	X		

362 Date of Publication	10	X	
400 Series - personal name	200	X	abcd
410 Series - corporate name	300	X	ab
411 Series - conference	500	X	acd
440 Series - title	500	X	av
500 General note	500	X	
501 Binding note	500	X	
502 Dissertation note	500	X	
504 Bibliography note	200	X	
505 Contents note	500	X	
507 Scale Note	100	X	
513 Type of Report	20	X	
520 Abstract	500	X	
521 Intended Audience	100	X	
541 Provenance Note	100	X	
555 Cumulative Index	100	X	
570 Editor note	200	X	
650 Keywords	500	X	
850 Holdings	100	X	
852 Location	100	X	

B Data Entry Worksheet (OPAC) for Monographs

Bibliographic Level (039): -----

Language Code (041): -----

Intellectual Level (007) : -----

Fiction Indicator (005): -----

Title Statement (245): -----

Author (s) Name (100): -----

Compiler (101): -----

Corporate Name (110): -----

Conference (111): -----

Edition (250): -----

Imprint (260): -----

Collation (300): -----

Series Personal Name (400): -----

Series Corporate Name (410): -----

Series Conference (411): -----

Series Title (440): -----

General Note (500): -----
 Bibliography note (504): -----
 Abstract (520) : -----
 Keywords (650): -----
 ISBN (020): -----
 ISSN (022) : -----
 Call Number (050): -----
 Copy (051): -----
 Location (852): -----
 Price (350): -----
 Accession Number (001): -----
 Date of Entry (008): -----

C. Data Entry Worksheet (SERIA) for Serials

Bibliographic Level (039): -----
 Language Code (041): -----
 Title Statement (245): -----
 Abbreviated Title (210): -----
 Author (s) Name (100): -----
 Corporate Name (110): -----
 Edition (250): -----
 Imprint (260): -----
 Collation (300): -----
 Series Personal Name (400): -----
 Series Corporate Name (410): -----
 Series Conference (411): -----
 Series Title (440): -----
 Frequency (310): -----
 Former Frequency (321): -----
 Abstract (520): -----
 General Note (500): -----
 Bibliography note (504): -----
 Editor note (570): -----
 Binding Note (501): -----
 Cumulative Index (555): -----
 Keywords (650) : -----
 ISSN (022): -----
 Call number (050): -----

Copy/issue (051): -----
Holdings (850) : -----
Location (852): -----
Price (350): -----
Accession Number (001): -----
Date of Entry (008): -----

D. Data Entry Worksheet (REPT) for Reports

Bibliographic Level (039): -----
Language Code (041): -----
Author (s) Name (100): -----
Corporate Name (110): -----
Title Statement (245): -----
Edition (250): -----
Imprint (260): -----
Projected Publication Date (263) : -----
Collation (300): -----
Frequency (310): -----
Source (265): -----
STRN (027): -----
Government Doc. Number (086): -----
Report Number (088): -----
Type of Report (513): -----
General note (500): -----
Dissertation note (502): -----
Binding note (501): -----
Contents note (505): -----
Call number (050): -----
Copy (051): -----
Location (850): -----
Price (350): -----
Accession Number (001): -----
Date of Entry (008): -----

E. Data Entry Worksheet (CART) for the Cartographic Materials

Bibliographic Level (039): -----

Language Code (041): -----
 Author(s) Name (100): -----
 Compiler (101): -----
 Corporate Name (110): -----
 Uniform Title (240) : -----
 Title Statement (245): -----
 Edition (250): -----
 Frequency (315): -----
 Mathematical Data (255): -----
 Imprint (260): -----
 Collation (300): -----
 Base Map Elements Code (009): -----
 Relief Code (006): -----
 ISBN (020): -----
 General note (500): -----
 Scale Note (507): -----
 Provenance Note (541): -----
 Intended Audience (521): -----
 Contents Note (505): -----
 Keywords (650): -----
 Call number (050): -----
 Copy (051): -----
 Location (850): -----
 Price (350): -----
 Accession Number (001): -----
 Date of Entry (008): -----

F. A Integrated (FST) for the Bibliographic Database (OPAC)

<u>ID</u>	<u>IT</u>	<u>Data Extraction Format</u>
020	0	MPL,V020
039	0	MPL,V030
050	0	MPL,V055
100	4	MHL,(V100^a/)
101	4	MHL,v101

Language Code (041): -----
 Author(s) Name (100): -----
 Compiler (101): -----
 Corporate Name (110): -----
 Uniform Title (240) : -----
 Title Statement (245): -----
 Edition (250): -----
 Frequency (315): -----
 Mathematical Data (255): -----
 Imprint (260): -----
 Collation (300): -----
 Base Map Elements Code (009): -----
 Relief Code (006): -----
 ISBN (020): -----
 General note (500): -----
 Scale Note (507): -----
 Provenance Note (541): -----
 Intended Audience (521): -----
 Contents Note (505): -----
 Keywords (650): -----
 Call number (050): -----
 Copy (051): -----
 Location (850): -----
 Price (350): -----
 Accession Number (001): -----
 Date of Entry (008): -----

F. A Integrated (FST) for the Bibliographic Database (OPAC)

ID IT Data Extraction Format

020	0	MPL,V020
039	0	MPL,V030
050	0	MPL,V055
100	4	MHL,(V100^a/)
101	4	MHL,v101

110	4	MHL,(V110/)
111	4	MHL,V111
210	0	MHL,V210
245	4	MDL,V245
250	4	MHL,V250^b, V250^c
260	4	MHL,V260
400	4	MHL,(V400^a)
410	4	MHL,(V410^a)
411	4	MHL,V411
440	4	MHL,V440
513	0	MPL,V513
520	4	MHL,V520
650	4	MHL,V650
852	0	MHL,V852

G. Display Formats

Part I. Display Format for Monographs

If v39 = 'M' then mhl,v245(2), if a(v245) and p(v240) then v240(2) fi if p(v100^a) then ' / by 'v100^a+| ;
 | fi if p(v110) then ' / ',v110 fi if p(v250^a) then ' . - ',v250^a fi if p(v250^b) then ' / ed. by ',v250^b+| ; | fi
 ' . - ',v260^a, ' : ',V260^b, ' ',v260^c, ' . 'fi/ if p(v300^a) then v300^a(2),',',fi if p(v300^b) then ' : ',v300^b fi
 if p(v300^c) then'; ' v300^c, ' fi if p(v440^a) then ' - (',v440^a if p(v440^v) then ' ; ',v440^v fi if p(v411)
 then ' . - 'v411 fi if p(v400^a) then '/by 'v400^a fi if p(v410^a) then ' / ',v410^a fi if p(v022) then ' , ISSN
 ',v022 fi, ') ' fi/ if p(v500) then v500(2,0) ' . 'fi/ if p(v504) then v504(2,0)'. 'fi/ v050(2)/if p(v051) and p(v852)
 then v051(2) ' ',v852 ' Library' else if a(v051) and p(v852) then v852(2) ' Library' fi fi if p(v022) then
 v022(2) fi/if p(v020) and p(v350) then ' ISBN ',v020 ' : ',v350 else if a(v020) and p(v350) then v350(2) else
 if a(v350) and p(v020) then ' ISBN ',v020 fi fi fi

Part II Display Formats for Serials

If v39 = 'S' then mhl,v245(2) if p(v245) and p(v210) then v245(2) ' : ',v210 else if a(v245) and
 p(v210) then v210(2) fi fi if p(v100^a) then ' / by 'v100^a+| ; | fi if p(v110) then ' / ',v110 fi if p(v250^a) then
 ' . - ',v250^a fi if p(v250^b) then ' / ed. by ',v250^b fi if p(v260^a) then ' . - ',v260^a, if p(v260^b) then ' :
 ',V260^b, fi if p(v260^c) then ' ',v260^c, fi ' . 'fi/ if p(v300^a) then v300^a(2),',',fi if p(v300^b) then ' :
 ',v300^b fi if p(v300^c) then'; ' v300^c, ' fi if p(v440^a) then ' - (',v440^a if p(v440^v) then ' ; ',v440^v fi
 if p(v411) then ' . - 'v411 fi if p(v400^a) then '/by 'v400^a fi if p(v410^a) then ' / ',v410^a fi if p(v022) then
 ' ISSN ',v022 fi, ') ' fi/ if p(v500) then v500(2,0) ' . 'fi/ if p(v310) then v310(2) fi/ if p(v321) then v321(2) fi/
 if p(v247) then v247(2) fi/ if p(v521) then v521(2) fi/if p(v555) then v555(2) fi if p(v504) then v504(2,0)'. 'fi/
 v050(2)/if p(v051) and p(v852) then v051(2) ' ',v852' Library' else if a(v051) and p(v852) then v852(2) '
 Library' fi fi/if p(v022) then ' ISSN ',v022 fi if p(v022) and p(v350) then ' ISSN ',v022 ' : ',v350 else if
 a(v022) and p(v350) then v350(2) fi fi

Part III Display Formats for Cartographic Materials

If v39 = 'C' then mhl,v245(2), if a(v245) and p(v240) then v240(2) fi if p(v100) then ' / by
,v100^a+| ; | fi if p(v110) then ' / ,v110 fi if p(v101) then ' / compiled by 'v101 fi if p(v250^a) then ' . -
,v250^a fi if p(v250^b) then ' / ed. by ',v250^b+| ; | fi if p(v507) then ' . - Scale :',v507 fi ' . - ',v260^a,' :
,V260^b,', ',v260^c,'. '/if p(v300^a) then v300^a(2),',',fi if p(v300^b) then ' : ',v300^b fi if p(v300^c) then';
' v300^c'.' fi if p(v440^a) then ' - ('v440^a if p(v440^v) then '; ',v440^v fi if p(v411) then ' . - 'v411 fi if
p(v400^a) then '/by 'v400^a fi if p(v410^a) then ' / ',v410^a fi ') ' fi if P(v41) then v41 fi/ if p(v241) then v241
fi/ if p(v255) then v255(2) fi/ if p(v521) then v521 fi/ if p(v541) then v541(2)fi if p(v500) then v500(2,0) '.'fi/
if p(v505) then v505(2,0)'. 'fi/ v050(2)/if p(v051) and p(v852) then v051(2) ' ',v852 ' Library' else if a(v051)
and p(v852) then v852(2)' Library' fi fi/ if p(v020) then ' ISBN ',v020 fi if p(v020) and p(v350) then '
ISBN'v020 ' : ',v350/ else v350(2) fi fi

Part IV. Display Formats for Reports

If v39 = 'R' then mhl,v245(2), if p(v100) then ' / by ',v100^a| ; | fi if p(v110) then ' / ',v110 fi if
p(v250^a) then ' . - ',v250^a fi if p(v250^b) then ' / ed. by ',v250^b| ; | fi ' . - ',v260^a, ' : ',V260^b,',
,v260^c,'. '/if p(v263) then v263 fi/ if p(v300^a) then v300^a(2),',',fi if p(v300^b) then ' : ',v300^b fi if
p(v300^c) then'; ' v300^c'.' fi/ if p(v310) then v310 fi/ if p(v513) then v513(2) fi/ if p(v502) then v502(2) fi/
if p(v500) then v500(2,0) '.'fi/ if p(v505) then v505(2,0)'. 'fi/ if p(v501) then v501(2) fi/ v050(2)/if p(v051)
and p(v852) then v051(2) ' ',v852 ' Library' else if a(v051) and p(v852) then v852(2) ' Library' fi fi/ if p(v027)
then 'STRN ',v027(2) fi/ fi

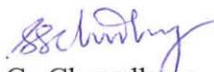
DECLARATION

The thesis is my original work and has not been presented for a degree in any other university.



Jane Grace Kidei

The thesis has been submitted for examination with my approval as a university advisor.



Dr. G. G. Chowdhury