ADDIS ABABA UNIVERSITY

SCHOOL OF GRADUATE STUDIES

SCHOOL OF INFORMATION STUDIES FOR AFRICA

INTERNET AND SUB SAHARAN AFRICAN ACADEMICS WITH PARTICULAR REFERENCE TO MAKERERE UNIVERSITY KAMPALA

By

JOYCE BUKIRWA NYUMBA

A Thesis

submitted in partial fulfilment of the requirements

for the degree of

Master of Science in Information Science.

May 1998

ADDIS ABABA UNIVERSITY

SCHOOL OF GRADUATE STUDIES

SCHOOL OF INFORMATION STUDIES FOR AFRICA

INTERNET AND SUB SAHARAN AFRICAN ACADEMICS WITH PARTICULAR REFERENCE TO MAKERERE UNIVERSITY KAMPALA

By

Joyce B. Nyumba

Name and Signature of Members of the Examining Board

Ato Getachew Birru, Chairman, Examining Board

Dr. Lishan Adam, Advisor

Ato Tamrat Bayle, Advisor

Dr. J. Cowell, External Examiner

ADDIS ABABA UNIVERSITY

SCHOOL OF GRADUATE STUDIES

SCHOOL OF INFORMATION STUDIES FOR AFRICA

INTERNET AND SUB SAHARAN AFRICAN ACADEMICS WITH PARTICULAR REFERENCE TO MAKERERE UNIVERSITY KAMPALA

By

Joyce B. Nyumba

Name and Signature of Members of the Examining Board

Ato Getachew Birru, Chairman, Examining Board

Dr. Lishan Adam, Advisor

Ato Tamrat Bayle, Advisor

Dr. J. Cowell, External Examiner

DEDICATION

To Irene Nampewo and Isaac Sebuyira.

Of course!

You painfully but patiently waited for mummy to put down her pen.

ACKNOWLEDGEMENT

The writing of this thesis has been possible with assistance from a number of individuals and organisations.

First of all I would like to extend my thanks to the International Development Research Centre, Canada (IDRC) for providing me with a scholarship to study at the School of Information Studies for Africa, Addis Ababa University. I also thank my employer, Makerere University, for granting me study leave. Gratitude goes to my advisors especially Dr. Lishan Adam for his assistance and provision of the relevant materials during the course of doing this work.

I would also like to extend my thanks to Ugandans and Kenyans living in Addis Ababa, especially Ms. Abigael Righa and her son Charles, Mrs. Grace Kalimugogo, Ms. Jane Magara and Mr and Mrs. Hilary Obino. Their assistance in various ways made life bearable during my two year stay in Addis Ababa. Thanks also go to the congregation of Addis Ababa Pentecostal Church and to members of the International Students Council at Addis Ababa University for their encouragement.

Special thanks to Ms. Esther Ng'endo Matu, a colleague and friend, with whom we shared the frustrations of every day and also comforted each other during the dark days as we wanted to "go home".

Lastly, I would like to extend my sincere thanks to my husband, Mr. Edward Nyumba, who kept on encouraging me as I sometimes wanted to "abandon"; to members of my family, especially sisters Annet Namusisi and Florence Nakiyaga, who took care of my children during the time I was away from home.

Praise and thanks go to our heavenly father, God the almighty. May the blessings emanating from his throne above be a portion to each and everyone of you.

THANK YOU!

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

ABSTRACT

The objective of this study was to examine the way Sub Saharan African Academics make use of the Internet as a means of solving professional problems, to identify the problems they encounter, and to propose guidelines that may be adopted with modifications where necessary to improve the use of the Internet by Academics in Sub Saharan Africa. The term "Academics" was used to refer to the teaching staff in Sub Saharan African universities. A questionnaire survey, supplemented by interviews, was conducted. The survey covered Academics at Makerere University main campus. Effort was made to browse the World Wide Web in order to identify the Sub Saharan African universities having Web Pages and the kind of information there is. Results indicated that most of the Academics were not using the Internet. Reasons given for not using the Internet included: lack of awareness, lack of access and very high cost. Academics using the Internet use it mainly for research purposes and personal communication and a big number of these users (45%) get 50% to 74% level of satisfaction from the services they use. Information about research in Sub Saharan African universities, which was given first priority by respondents to the questionnaire, was found to be missing on all the Sub Saharan African university Web Pages that were browsed. The findings of this study called for the need to co-ordinate Internet services in Sub Saharan African universities, infrastructure development, creation of awareness, encouraging use among female Academics and Professors, user training, repatriation of useful information, reduction in the cost of Internet services to the Academics and involving Academics in content generation for the World Wide Web.

CHAPTER ONE

1.0 INTRODUCTION

1.1 BACKGROUND INFORMATION

The purpose of this study was to investigate the extent and pattern of use of the Internet by university Academics in Sub Saharan Africa by taking Makerere University as a case and to come up with recommendations aimed at improving use of the Internet by Academics in Sub Saharan African universities. The term "Academics" was used to refer to the teaching staff in Sub Saharan African universities. For the case of Makerere University, Academics include Assistant Lecturers, Lecturers, Senior Lecturers, Associate Professors and Professors.

1.2 STATEMENT OF THE PROBLEM

All sectors ranging from education to agriculture and health are now vulnerable to obscurity and obsolescence by the global economy if they can't access and share in the dynamic developments crossing the global information highway (Carty 1997). Higher education in Sub Saharan Africa is equally in a state of financial, political and educational crisis and probably one way out is to empower those involved in lifting the

standard of higher education in the region.

AAAS (1996) reported that the major information difficulties facing African researchers have become well known, and can be divided into three basic categories, namely: accessing relevant information, communicating with colleagues and disseminating research results. Isolation from colleagues and from current information in their discipline, for technical as well as financial reasons, has hampered the efforts of many African scientists to advance the frontiers of knowledge within their fields.

Meanwhile, lack of knowledge on how to get the needed information, how to share information, how to keep up with changes, and how to cope with the costs of doing so were the issues raised at the "Workshop on databases: the needs and contributions of African researchers" (UNECA and AAAS 1995).

Sub Saharan African Academics continue to be underrepresented in international databases. Most of the time, important research takes place in Africa, but many times the results go unpublished and unidexed and are therefore relegated to the status of "grey literature". Publishing avenues are very limited. Organising a dependable peer-review system is also difficult. Journals are not sustained as many have fallen by the wayside or are published very irregularly. Researchers have therefore become unpublishing researchers but conducting research each season (Ekwamu 1995). Consequently, information generated in Africa does not reach the broad world wide

audience that it deserves to reach (AAAS 1996).

Furthermore, vast majority of information on Sub Saharan Africa resides in databases in the developed world. But unfortunately, it would appear that very little of this information refers to actual publications like research published within Africa (UNECA and AAAS 1995). This means serious implications for cost and accessibility of information for Sub Saharan Africa. Besides, international databases may be poor sources for location-specific national information, which is important for the researcher in Sub Saharan Africa.

There is very limited circulation of scientific information published in Africa to the extent that Sub Saharan African Academics face a problem of ignorance about previous research efforts. Awareness of what information, both published and unpublished, is available in Africa, is not there. Consequently there is continued duplication of research and wasting of precious resources.

There is general lack of facilities to conduct research in most of the Sub Saharan African universities. Lishan Adam (1993) emphasising this point said that Academics in Sub Saharan Africa work under extremely difficult conditions with statistics indicating that African universities invest only a small percentage of their budgets on research and development. Laboratories are poorly equipped with only a few universities having managed to acquire expensive analytical instrumentation and the necessary support for

maintenance and repair. Examples of such institutions are found in South Africa and in a few other countries. The need for up-to-date equipment is particularly acute in some disciplines of the natural sciences, like chemistry, where research is possible only when there is access to the necessary tools that provide information on the structures and properties of molecules.

The 1997 World Bank document on the African Virtual University also reported that the quality of educational materials is poor in Sub Saharan African universities. Francophone universities spend only 27% of their budgets on educational materials while Anglophone universities spend 6%. Libraries in Sub Saharan Africa have suffered terribly as collections have become outdated. Access to up-to-date textbooks remains a problem in many universities. Magazines and journals are often months and sometimes years, out of date (Vrij Nederland 1995). Databases and/or the means by which they are accessed unfortunately often represent a barrier, rather than a path to progress (UNECA and AAAS 1995).

Despite the diminishing resources available to public universities in Sub Saharan Africa, student populations continue to grow. Besides, universities cannot afford to hire skills, journal subscriptions cannot be maintained and library shelves cannot be filled. Apparently, current information on universities is also outdated, the student body is poorly prepared, staff development is limited and curriculums are outdated. There is difficulty in establishing research collaborations, information on scholarships is lacking,

coupled with declining average academic quality and prestige plus diminished job prospects for graduates.

In such a state of crisis, new information technologies like the Internet could be of paramount importance. The Internet has been referred to by AAAS (1996) as the world's single most powerful enabler of scientific, academic, and economic development activities and therefore too important to ignore. However, most of the time there is a gap as noted by Carty (1997) that although academic networkers are keenly aware of trends in the telecommunications sector, they rarely identify the deficiencies in research production and use, even though ostensibly, this is the activity they are working to support.

Although the Internet may not offer total solution to all the problems facing higher education and Academics in Sub Saharan Africa, it may be one of the most powerful and cost-effective weapons in the search of solutions. This study therefore made an attempt to find answers to a number of issues that could probably lead to ways and means as to how the Internet could be utilised to the maximum benefit not only by the Academics but the entire university communities in Sub Saharan Africa. Bearing the above ideas in mind the following research questions were formulated to guide the study:

1. Do Makerere University Academics know what the Internet is?; Are they using it and if not why are they not using it?;

2. How are Makerere University Academics using the Internet and why do they use it that way?;

3. What problems do the Academics face in relation to Internet use and how can they be dealt with?;

4. Are the interests of Sub Saharan African Academics well represented on their universities' Web Pages?

1.3 JUSTIFICATION OF THE STUDY

This study is justified based on the idea that university Academics may not be making full use of the Internet due to one reason or the other. Many universities in Sub Saharan Africa have got Internet access but its likely that the Internet services in these universities are under utilised, not widespread and a large proportion of potential users are non users. This is probably because no single study has been carried out to assess all the requirements relating to Internet use in Sub Saharan African universities. Its not enough to have Internet access but the service should be made use of profitably. This

situation has to be analysed critically and as a result, to suggest recommendations that will improve utilisation of the service by the university Academics. According to Seracervic (1980), it is quite evident that often the fundamental ideas about promotion of information systems and services are lacking, although considerable discussion about the need for recognition of their value is present. The connection between the two is not made. It was the purpose of this study to come up with the necessary recommendations to address the issues relating to Internet use by Academics in Sub Saharan Africa.

With the Structural Adjustment Programs (SAP) urging for accountability and cost-effectiveness in all spheres of university life and the universities struggling to maintain their goal for academic excellence (Ocholla 1996), the advent of the Internet needs to be taken as an advantage. Considering that universities in Sub Saharan Africa have made the effort to make the Internet service available, and are paying money to sustain the service, issues that prohibit the use of the service by the people for which it was intended have to be addressed. For example, having incurred the connection costs, Makerere University Library pays 50$ per month as subscription to an Internet Service Provider, 2,000$ for telephone charges per month and 25$ for computer maintenance per month (Gamukama, Pers. Comm.).

1.4 OBJECTIVES OF THE STUDY

1.4.1 General objective

The general objective was to study the way Sub Saharan African Academics make use of the Internet as a means of solving professional problems, to identify the problems they encounter, and to propose guidelines that may be adopted with modifications where necessary to improve the use of the Internet by Academics in Sub Saharan African universities.

1.4.2 Specific objectives

In order to achieve the general objective of the study, the following specific objectives were derived:

1. To study the way in which Makerere University Academics make use of the Internet and why they use it that way.

2. To determine the problems being faced by Academics in relation to utilisation of Internet services at Makerere University.

3. To establish the kind of information that universities in Sub Saharan Africa contribute to the World Wide Web for the benefit of the Academics.

4. To suggest possible recommendations concerning Internet service utilisation by university Academics in Sub Saharan Africa.

1.5 SIGNIFICANCE OF THE STUDY

This study is a contribution to the literature relating to use of the Internet by university Academics. From the literature reviewed for this study (see chapter 2), no such study had been carried out earlier on in Sub Saharan Africa. Hence, the results of this research will be useful to those concerned with stimulating the use of the Internet and other information technologies in Sub Saharan African Universities. As a result of this study, it may even be possible to stimulate interest in the application of marketing strategies to the management of Internet services in Sub Saharan African universities. Secondly, knowing the right way through which the Internet can be made accessible and used profitably by university Academics is one issue that this study addressed. The findings of the study may give an insight to those providing the Internet service at Makerere University as to what is expected of them. This does not only apply to Makerere University but also to other universities in Sub Saharan Africa and beyond.

Furthermore, this study may create awareness among the Academics and also highlight

the challenge facing them regarding the need to participate in activities that contribute to their professional growth, for example, disseminating information to the outside world using the Internet therefore becoming not only consumers but also producers of information. As a result they may be in a position to encourage students to make use of the Internet and other information technologies during the course of their study; they may improve the university curricular in Sub Saharan African universities and probably even cope with the standards of universities in other parts of the world.

Other beneficiaries of this study include people already making efforts to put information from universities in Sub Saharan Africa on the Internet and university policy makers, especially Information Technology Committees for Sub Saharan African universities, if any. Library and Information service professionals in universities plus students of Information Science in Sub-Saharan Africa are also likely beneficiaries of this study.

1.6 SCOPE AND LIMITATIONS OF THE STUDY

This study was carried out at Makerere University main campus. Faculties that are not located at the main campus were not included in the study. Hence the study covered Academics from 11 faculties, 2 institutes and 1 centre. These had a total of 713 Academics who were taken as the survey population. Although the Internet is expected

to benefit each and every member of the university community, this study covered only the teaching staff (Academics) as it was assumed that these should be pioneers in promoting the use of Information technologies not only at the university but also to the country at large. According to the posts held by Academics at Makerere university, the population studied included Assistant Lecturers, Lecturers, Senior Lecturers, Associate Professors and Professors.

The study concentrated on just one form of Information Technology application (the Internet). Use of other information technologies like the CD-ROM were not covered. Details relating to the African Virtual University were also not included in the study.

While assessing the content that universities in Sub Saharan Africa have on the World Wide Web, universities studied were chosen from Anglophone Sub Saharan Africa.

1.7 METHODOLOGY

1.7.1 Data collection

A survey method was used for collecting data from Academics at Makerere University. A survey is a systematic collection of data concerning the user group, their activities, information needs and uses, and gives an oversight of a field at a given time (Bawden

1990).

Document analysis was another method employed for this study. Documents in this case refer to all written materials that contain information relevant to the area under study. Not all information was obtained through the survey conducted, therefore documents that the researcher found relevant to the study were studied.

In order to study the content that universities in Sub Saharan Africa have on the World Wide Web, browsing was adopted as another method for this study. Searching the World Wide Web was done in order to:

- identify the number of universities in Sub Saharan Africa that provide information on the World Wide Web;

- identify the kind of information that Sub Saharan African universities have on the World Wide Web; and

- identify what kind of information is missing on these universities' Web Pages;

Search engines used included: Altavista, Yahoo and HotBot while search queries were formulated in the form of "name of country+university"; such as; Namibia + University, Senegal + University.

1.7.2 Population and sampling

The survey covered Academics (teaching staff) at Makerere University main campus. The total population was 713 from 14 academic units (11 faculties, 2 institutes and 1 centre). Stratified random sampling was used as it is very useful in opinion survey studies and stratification introduces a secondary element of control as a means of increasing precision and representativeness. It was also found to be very useful since the lists of individuals in the population were not readily available (Koul 1984). Academics belonging to a particular academic unit (faculty/ institute/ centre) were grouped into one strata. The number of respondents was selected in proportion to the size within the strata. Garrett (1962) pointed out that if the size of the sample is less than 25%, there is often little reason for believing such a small group of units to be adequately descriptive of any population. Therefore, for better precision, a sample of 185 (26%) was studied. The sample size within the strata was selected with proportional allocation such that the number of individuals selected from the different strata was proportional to the total number of individuals in the strata. Appendix 1 shows the number of Academics in each of the faculties/ institutes and centres included in the survey and the number of questionnaires that were distributed accordingly. In order to boost the response rate and given the short time (two weeks) during which the study was carried out, Academics within each stratum were selected just at random.

Non probability sampling method, purposive sampling in particular, was applied to select some Academics for interviewing. Purposive sampling is a method whereby the units for study are selected at the discretion judgement of the researcher, as a representative of the total population. This method is convenient in a situation where the sample to be selected is very small, and the researcher wants to get some idea of the population characteristics in a short time, with ease of access, and intent to get insight into the problem by selecting only samples that can provide maximum degree with comprehensive coverage (Koul, 1984 and Kothari 1990).

At least one university from every Anglophone Sub Saharan African country was considered for Web browsing in order to study the content that Sub Saharan African universities have on the World Wide Web. The Republic of South Africa was deliberately left out as its among the top 15 countries in the world in the number of Internet nodes (Jensen 1997). In addition to this, it got Internet access much earlier than the rest of the Sub Saharan African countries.

Universities that were found to have some information on the World Wide Web, together with their Uniform Resource Locators are given in appendix 2.

1.7.3 Survey instruments

1. Questionnaire

A questionnaire (appendix 3) was used to collect data from Academics at Makerere University. The rationale behind selecting questionnaire as a means of data collection was its popularity as a means of collecting all kinds of data in research (Koul 1984). Secondly, this method is recommended by Kothari (1990) as suitable when the universe to be studied is widely distributed geographically and can hardly be approached in person. The central point of administration of questionnaires was the East African School of Library and Information Science (EASLIS), Makerere University. Services of a research assistant were sought. Administrative assistants and secretaries in faculties and institutes were used as points of contact between the research assistant and the respondents.

The questionnaire included an introductory letter in order to give respondents an idea about the study and a brief explanation of what the Internet is. It was composed of 5 sections, namely,

- Personal data;

- Use or non use of the Internet: this section required one to specify whether he/she

had used the Internet before or not and then proceed to the relevant section accordingly;

- Non use of the Internet: this section was to be filled by those who had never used the Internet before;

- Use of the Internet: this section was meant for those who had used the Internet before; and

- The Internet as a facility for disseminating information. Respondents were given a list of different kinds of information that universities can put on the World Wide Web and were required to put a tick against the type of information they felt should be given highest priority.

The questionnaire was pre-tested for clarity of questions with 10 international students studying at Addis Ababa University and 4 lecturers from the department of Biochemistry and the Institute of Languages at Makerere University.

A total of 185 questionnaires were distributed out of which 134 (72%) were returned.

2. Interview

In order to confirm the data that was received through questionnaires and to gain a clear understanding of the real situation, unstructured interviews were conducted with 10 Academics. This type of interview gave the respondents much freedom to talk about the problem under investigation (Koul 1984). The interview guide questions that were used are given in appendix 4.

Interviews were also conducted with people concerned with the development of the Internet and the telecommunication sector in Uganda and at Makerere University. The purpose of these interviews was to get to understand the Internet and Telecommunication environment in Uganda so as to establish possibilities of improving the conditions under which Makerere University Internet services are provided and utilised. The names of people who were interviewed and their parent organisations are given in appendix 5 while the interview guide questions are shown in appendix 6.

1.7.3 Data analysis

Data analysis refers to the computation of certain indices or measures along with searching for patterns of relationships that exist among the data (Kothari 1985). Tabulation and simple percentages were used in the analysis of the data collected. Tabulation helped in conserving space, reduced explanatory and descriptive statements

to a minimum and facilitated the process of comparison, summation of items and detection of errors and omissions. Percentages simplified numbers, reducing all of them to a 0 to 100 range. Through the use of percentages, the data were reduced in the standard form with base equal to 100 which facilitated relative comparisons (Kothari 1985).

1.7.4 Software used

Word processing of the thesis was done using Microsoft Word, version 6.0. Browsing the World Wide Web was done using Microsoft Internet Explorer employing Altavista, Yahoo and HotBot search engines. The prototype Web Page was designed using Notepad editor and was tested using Netscape, version 3.0.

1.8 ORGANISATION OF THE THESIS

This thesis is made up of six chapters. Chapter one gives the background to the study, the statement of the problem, justification, objectives, methodology used for the study including the sampling method.

A review of the literature relating to the history of the Internet, its applications and use by university Academics in various parts of the World is presented in chapter two.

Chapter three gives a review of the situation in Sub Saharan Africa including the state of Internet connectivity in the region. This is followed by the Internet connectivity situation in Sub Saharan African universities and an analysis about the content that these universities have on the World wide Web presented in chapter four.

Chapter five gives the findings of the questionnaire and interview survey conducted at Makerere University so as to answer some of the questions for which this study sought answers. The conclusions and recommendations are presented in chapter six which ends with recommendations for further studies and a concluding remark.

CHAPTER TWO

2.0 INTERNET USE BY ACADEMICS: A REVIEW OF THE LITERATURE

2.1 INTRODUCTION

In this chapter, both the definition and history of the Internet as given by various authors are presented. This is followed by a look at the different Internet applications. The various studies that have been carried out relating to Internet use by Academics have also been discussed together with the benefits that the Internet offers for Academics.

2.2 INTERNET: DEFINITION AND HISTORY

A number of authors have defined the Internet according to the way they understand it while ideas relating to its history have not diverged so much. Internet has been defined by Moody (1996) as a co-operative network of computer networks that links together millions of machines from the mightiest mainframe to the humblest home computer. Paxton and Baker (1997) define the Internet as a network that allows millions of computers around the world to communicate with each other in a flexible, economical,

easy-to-use way. Further explanation is given saying that the Internet accurately allows electronic devices to communicate with each other, as there are already examples of cell-phones, pagers, video cameras and other devices collecting or relaying information via the Internet. Mathews (1995) refers to the Internet as a giant network of users, computers and information resources.

Internet is the world's largest growing repository of digital information (Gilster 1994) and connects over 1.7 million hosts and a user community estimated at approximately 30 million people (Carl-Mitchell 1997).

According to Moody (1996), the Internet grew out of a project begun by the United States Department of Defence. This network was initially called ARPANET, taking its name from ARPA (Advanced Research Projects Agency), which later became DARPA. Although created by the United States military, it soon added United States University departments that were working on military projects, and which needed to exchange information with bases around America. In the early 1970's, the first overseas nodes were added, in the UK and Norway. Again, these were purely military connections, and were designed to aid communications with friendly powers. As more and more universities joined, the network became an important way of communicating amongst themselves, rather than purely a means of linking them to the military machine. Recognising this, the United States government set up a formal backbone to the growing academic network called Computer Science Research Network (CSNet) largely funded

by the United States National Science Foundation (NSF). This eventually grew into what was called NSFnet, the main backbone of the Internet to which all other networks were connected, and forming the main data pipe between other subsidiary networks which served local needs. In the UK, the equivalent backbone was called JANET(Joint Academic Network).

Due to the need to formalise the increasing number of networks, the TCP[1]/IP[2] protocol was developed and it was from the second part of this acronym that the Internet derives its name. All computers that make up the Internet are bound to this communication protocol.

Krol and Hoffman (1993) offer a complete definition of the Internet used for this study. Internet is (1) a network of networks based on the TCP/IP protocol, (2) a community of people who use and develop these networks, (3) a collection of resources that can be reached from those networks.

---

[1]TCP stands for Transmission Control Protocol, a byte stream protocol that provides reliable end-to-end communication between two processes running on the same or different host systems.
[2]IP stands for Internet Protocol and can be defined as a simple best-effort packet switching protocol that allows many different interconnected networks to share the same virtual address space and form a single Internetwork. (Source: Carl-Mitchell, 1997)

2.3 INTERNET APPLICATIONS

The Internet is not an end in itself and it would not serve any purpose if it didn't have the various applications that make it useful. These applications have been presented and explained by different authors and they include: Electronic Mail, Usenet/Network News, Listservs, File Transfer, Telnet, Gopher, Wide Area Information Servers, and the World Wide Web. Details about each application are discussed in the following sub-sections.

2.3.1 Electronic Mail

Electronic mail is a type of communication that allows one to send and receive correspondence by computer, instead of putting a letter in the mail or using fax machine (AAAS 1995). Sending electronic mail on the Internet is similar to sending mail through the post office, except it goes there almost instantaneously (Heslop and Angell 1994). According to Faye (1997), electronic mail is the most popular Internet tool because of its capacity to transport large amounts of data in long distances in a very short time. It enables on-line and off-line exchange of information between users in different countries at a cost of a local telephone call or less.

Moody (1996) commends electronic mail as the simplest of all the Internet services, but also the most powerful. This is so because its reach is actually beyond the Internet since

author, subject or an author-given synopsis (Krol 1994).

By 1996, there were over 10 000 separate subject areas, or newsgroups, with more being created by the day (Moody 1996). Newsgroups are often moderated. A moderator reads input information before dispatching it off to other subscribers.

2.3.3 Listservs

Also known as electronic mailing lists (AAAS 1995), Listservs are discussions and conference fora that automatically distribute mail to subscribers. Its a way of disseminating information, or even holding a discussion by electronic mail, by sending a single message to numerous recipients who comprise an identifiable interest group (AAAS 1995). They are usually formed according to common interests like subjects, countries, regions, etc. Once one is a member of a Listserv, he/she can ask questions and answer queries and also comment on other members' messages. He/she can also read all the mail which was exchanged before his/her membership. All the mail exchanged within a Listserv is archived in a database which can be retrieved and sent upon request to any member.

A Listserv has got a moderator, who acts as a chairperson. The Listserv automatically distributes the mail posted by one subscriber to all subscribers wherever their location is

in the world, hence enabling exchange of views globally. Examples of Listservs in Africa are given in appendix 7.

2.3.4 File Transfer Protocol (FTP)

File Transfer Protocol (FTP) has been defined by AAAS (1995) as a method of transferring files from a remote computer to one's own computer. The files that can be transferred reside on certain computers that are registered as FTP sites although files can also be transferred from computer bulletin boards. Through the File Transfer Protocol, the Internet is able to retrieve files from distant computers (Moody 1997). This application enables users to retrieve software programs, text files, graphics and sound via the Internet. FTP services are usually free of charge and play an important role in updating software programs and utilities (Faye 1997). They enable access to information resources which are not on the World Wide Web (Details about the World Wide Web are discussed in section 2.3.8).

2.3.5 Telnet

Telnet lets one connect to a distant site and then control its computer as if he/she were directly linked to it. It is a powerful tool, letting one control huge computers around the globe although it requires one to be able to speak the language of the remote computer.

Accessing libraries is a very common use for Telnet (Moody 1996). Telnet also makes it possible for one to open his/her mail box and read the mail when one is out of the duty station say on mission or for some other reason.

2.3.6 Gopher

According to Heslop and Angell (1994), Gopher is a slang term for someone who fetches things to another person. Its a protocol and program which integrates a variety of services into a single application. It searches, retrieves and displays documents from remote sites on the Internet.

Developed at the University of Minnesota as a distributed information service , Gopher helps one when confronted with the problem of too many sites holding too much. Its name comes from its ability to 'go for' things. Its structured in the form of a series of on-screen menus offering various options, each of which may lead to another menu. Gophers usually come with an extra feature called Veronica which is a search system that looks through all the Gopher menus and entries that it knows about (Moody 1996).

Krol (1994) says that Gopher can access FTP archives, phone numbers from white pages servers, library catalogues and other databases with special purpose (TELNET-based) servers. He goes further to say that only Gopher knows where the data really is,

how to access it, and that there are multiple servers providing it. In the space of about 4 years, the Gopher system grew from one site to over 1300 sites.

However, Gopher is a traditional information delivery tool whose use has been reduced with the advent of the World Wide Web through integration.

2.3.7 Wide Area Information Servers (WAIS)

Like Gopher, WAIS is also a traditional information delivery tool which has been integrated to the World Wide Web. The idea behind WAIS is that data is held not centrally on one computer, but is spread all over the world on hundreds of them (Moody 1996). The WAIS service helps one to search indexed material. One can search for particular words or phrases and WAIS will give a list of on-line files that contain those words. Its like walking into a library with a quote and having the library automatically check out everything that contains it. WAIS works with collections of data/ databases. By 1994, there were more than 500 WAIS libraries on the Internet (Krol 1994).

2.3.8 World Wide Web

This is the newest of all Internet applications. Davis (1995) defines the World Wide Web as a globally distributed information system based on hypertext[3] while Moody (1996) defines it as a collection of documents held on computers around the world that are linked together to form what is called hypertext. The World Wide Web can be described as a vast information bank where information can be accessed on-line and is composed of sites and Web Pages made up of text, graphics and sound linked by the Hypertext Mark-up Language. The idea is that instead of reading a text in a linear fashion, from beginning to end, there are certain points that let one jump to other documents, either on the same machine or anywhere else on the Internet. Hypertext files may have images, sound, even videos that are linked up with other spots creating a complete multimedia document sometimes called hypermedia and the totality formed in this way is called the World Wide Web.

The development of the World Wide Web took place at CERN, the European Particle Physics Laboratory (Krol 1994). It represents the future for the Internet (Moody 1996). The world of computing and information dissemination has changed dramatically since its start in 1989 with one estimate of the growth of the number of users of the Internet implied doubling every after six months (Mathews 1995).

---

[3]Hypertext is a method of presenting information where selected words in the text can be expanded at any time to provide other information about the word. These words are links to other documents which may be text, files, pictures, etc. (Krol 1994)

2.4 INTERNET USE BY ACADEMICS: A REVIEW

From the literature reviewed for this study, no such study has been carried out in Sub Saharan Africa. However studies have been carried out on Internet use in other parts of the world and these have been grouped into three major categories by Lazinger, Bar-llan and Peritz (1997). These categories are:

- studies of Internet use among library and information professionals;
- studies of Internet use among other sectors of the population (except college or university faculty members) or in the general population; and
- studies of Internet use among college or university faculty members.

Details of these studies are discussed by Lazinger, Bar-llan and Peritz (1997) with detailed analysis given to studies of Internet use by college or university faculty members. Brown (1994) is quoted stating that:

"*a widely quoted fact on the Internet is that only 10% of the faculty at institutions with access to the Internet actually use the Internet. And of those only 30% use it for anything other than electronic mail. There are many possible reasons for this. One is the lack of awareness of the information resources on the net and of the skills to locate the specific information required.*"

population.

Another study by Walsh and Bayma (1996) analysed the effects of computer network use on academia science. The survey was based on interviews with 67 scientists in 4 disciplines: mathematics, physics, chemistry and experimental biology. The results indicated that Computer Mediated Communication may be leading to new collaboration patterns, more communication within collaborations, and peripherallity effects and that these effects are heavily mediated by the nature of access and the social context into which Computer Mediated Communication has been introduced.

Alexander (1995) in her dissertation examined the use of Internet Listservs as post-teleconference support to faculty at community colleges and two-year institutions and found out that 47% (nationally) of community college teleconference participants had access to the Internet and 305 knew how to use electronic mail.

A study by Chu (1994) revealed that an E-mail survey administered to faculty at two US universities showed that there were positive relationships between e-mail use and such variables as speciality and experience with computers. The majority of the faculty members (92%) included in the study used e-mail in scientific communication.

A study carried out in Australia by Bruce (1995) analysed data from two samples of Academics from a wide field of disciplines in 13 Australian universities, to determine

how Academics in Australia use the Internet to enhance their teaching. The results indicated that the Internet for Australian Academics represents a mechanism for overcoming the disadvantages of academic teaching which may arise from institutional amalgamation, geographic remoteness or under-representation of certain teaching disciplines in Australian universities.

Adams and Bonk (1995) conducted a four-campus survey of faculty use of electronic information technologies and resources by the SUNY university Centre Libraries. The survey included respondents from all academic disciplines and measured the use and frequency of use of electronic information resources. This study measured non-use as well. The conclusions of this study state that "*the most common obstacle to the use of electronic information resources by faculty is a lack of knowledge about what is available, and that user training is considered by faculty to be a high priority need*".

Abels, Leibsher and Denman (1996) explored the factors that influence the adoption and use of electronic networks and network services by science and engineering faculty in small universities and colleges. This study explored the use of a broad range of Internet services and included non-users as well. A study very similar to this was carried out at the Hebrew University of Jerusalem. The purpose of this study was to examine and compare use of the Internet among various sectors of the faculty, in order to verify the influence of a number of parameters on its use. These parameters included:

- the field and research interests of the faculty members; formal training in the use of the Internet via courses, workshops, etc.;

- self-instruction in the use of the Internet by means of manuals, how-to books, etc.;

- general use of computers; and

- perceived need for the information this network can provide.

The conclusion reached by this study was that faculty members in the sciences and agriculture tend to use the Internet more intensively than faculty members in the humanities and social sciences.

2.5 BENEFITS OF INTERNET USE TO ACADEMICS

Internet has got quite a number of benefits to universities in Sub Saharan Africa and to Academics in particular. Through the use of the Internet, locating resources has been possible, getting scholarships has become easier and capacity for research has improved. The National Research Council (1996) reported about a survey carried out in Ethiopia, Uganda, Zambia and Senegal whose results indicated that academic and research institutions were realising the potentials of full Internet connection. Academics were reported to have been able to conduct joint projects effectively, improve resource

mobilisation and carried out research between distant sites inexpensively.

Bullen & Bennet (1991) and Finholt & Sproull (1990) quoted by Walsh and Bayma (1996) say that computer networks have shown to reduce the need for co-workers to be collocated. The ability of the networks [Internet] to quickly disseminate questions to a large number of people allows scientists to interact in a 'down-the-hall' way with people spread over a large area.--interaction on the Internet provides fewer status clues than does face-to-face communication, or even mail or phone interactions (Walsh and Bayma 1996).On the same topic, a report from a workshop held in Ghana in 1993 emphasised the importance of the Internet in universities saying that it has evolved into far more than a communications medium and has itself become an integral part of universities' infrastructure (AAAS 1993).

"Internet access must be seen as an essential and cost-effective way of providing access to the world of information that is the lifeblood of universities and research institutions." (AAAS 1996). Some of the benefits of the Internet to Academics in universities in sub Saharan Africa are discussed below.

The Internet allows for correspondence with colleagues and access to colleagues in Africa and overseas through nearly instantaneous transmission/receipt of e-mail messages and files. Sharing information and data with individuals or groups (AAAS 1995) is made possible with the Internet including keeping in touch with the latest

developments in one's discipline.

The Internet offers powerful search utilities to locate information stored on millions of computers around the world hence allowing researchers to study problems even if their local institutions lack sufficient computing resources;

The Internet also allows access to a large and growing array of on-line scientific journals and databases as for example the electronic pre-print bulletin board set up by a theoretical physicist at Los Alamos (Taubes, 1993 cited in Walsh and Bayma 1996). This bulletin board provides subscribers with abstracts of all the newspapers and allows subscribers to send e-mail requests and receive the full paper, with graphics, electronically. This service began in August 1991, and by December 1992 it had 8000 subscribers and the database was soon receiving about 600 newspapers per month. This pre-print database has contributed to the inclusion of a greater number of theoretical physicists world-wide into the pre-print loop (Walsh and Bayma 1996).

Distance education is also made easy by the Internet. An example is the African Virtual University which was launched in July 1997 with 7 satellite receive terminals already installed and operational in English speaking African countries, namely Ethiopia, Kenya, Uganda and Zimbabwe.

Its also possible to disseminate African research and other information to the outside

world. The African studies web site at the university of Pennsylvania is an example of this. According to Weibel (1995), scholarly societies are establishing their presence on the web in growing numbers, recognising it as an important means of maintaining contact with their members.

Co-operative projects and facilitation of peer review, thereby strengthening research and journals publication. Walsh and Bayma (1996) say that while carrying out collaborative research projects, electronic mail can be used to monitor colleagues' progress and to address project problems as they arise. Networks also help create virtual research teams that link a variety of scientists, with each contributing his or her unique skills to the project. Projects can take advantage of the Internet to get access to exactly the skills that are needed while researchers can also take advantage to gain access to a wider variety of projects that can make use of their skills.

Walsh and Bayma (1996) came up with three areas where Computer-Mediated Communication (CMC) may be affecting scientific work from their study carried out to analyse the effects of computer network use on academic science, conducted from January 1991 to October 1992. The three major areas included: changes in collaboration patterns, frequency of communication and peripherallity effects.

The changes in collaboration patterns in a variety of fields were reported as increase in research group size and increase in remote collaborations. The introduction of CMC

was associated with a dramatic increase in joint-authored papers. It was also found out that one of the main virtues of this new technology is that it helps overcome some of the barriers that geographic separation creates and that this is most noticeable in international collaborations, where cost, time zones, and language all create barriers that electronic mail over the Internet was particularly well suited to overcome. The Internet can therefore be seen as a way of extending one's network of potential collaborators and facilitating existing collaborations by allowing personal contacts to continue as collaborations even after colleagues have separated.

On frequency of communication, CMC was commended as beneficial to Academics as it helps contribute to the overall increase in the amount of communication performed during a research project. This is made possible through the use of distribution lists, bulletin boards, electronic mail and by distributing pre-prints and other crucial information electronically. Such method of communication may help allow all members of the collaboration to stay "in the loop".

Coming to the peripherallity effects, CMC was seen as a means of providing new opportunities and resources to younger scientists and those located at less prominent institutions , for example, scientists who were trained at research centres can maintain their research contacts when they move to more peripheral institutions. Secondly, specialists isolated in remote departments can maintain intellectual ties with former and new colleagues. Participation by less prestigious institutions becomes possible in the

process. Electronic mail allowed those who would previously have been excluded from the most up-to-date information to have access to that information, to stay current in the field, and those at less prestigious institutions to be able to participate in the scientific communities. Electronic mail may facilitate the creation of new ties between remote collaborators and gives lower status scientists the ability to query their more eminent colleagues. Such contacts may allow scientists who lacked the access needed to stay current and be active participants and perhaps future core members of their fields.

Walsh and Bayma (1996) conclude by saying that CMC may be the key to staying research active for Academics in peripheral institutions and this could as well be true for Sub Saharan Africa.

2.6 SUMMARY

In this chapter, the definition and history of the Internet has been presented. Different studies that have been carried out relating to use of the Internet by Academics in various parts of the world have been analysed. Benefits of the Internet as presented by various authors have also been discussed.

CHAPTER THREE

3.0 INTERNET IN SUB SAHARAN AFRICA

3.1 INTRODUCTION

This chapter deals mainly with the state of Internet connectivity and use in Sub Saharan Africa. An overview of Sub Saharan Africa is given in order to gain a clear understanding of the situation under which the universities under study operate. This is followed by a discussion about the problems and prospects on Internet connectivity and use in the region plus the growth and development of Internet in Uganda.

3.2 SUB SAHARAN AFRICA: AN OVERVIEW

Sub Saharan Africa comprises forty nine countries whose names are listed in Appendix 8. It covers a surface area of approximately 24 283 000 square kilometres out of 30 037 000 square kilometres of the whole of Africa (UNECA 1994). Its population is approximately 572.9 million out of Africa's 701.1 million. Sub Saharan African countries are characterised by great differences in climate, soils and vegetation (Sparks 1995).

People in Sub Saharan Africa, along with South Asia remain among the poorest in the world in real income and access to social services (World Bank 1996). Twenty eight of the thirty six least developed countries of the world are in Sub Saharan Africa. Seventy to eighty percent of the population live in rural areas. In 1993 an estimated 40 percent lived on less than US $1 per day (World Bank 1996).

Some other facts about Sub Saharan Africa are summarised below.

- Sub Saharan Africa has lost the ability to feed itself as most countries now depend on food imports (Sparks 1995).

- Sub Saharan Africa is burdened by foreign debt and has difficulties in attracting investment. World recession, the collapse of commodity prices, and escalating foreign debt repayments have, over the past twenty years increasingly devastated the economies of most of the countries (Hill 1994).

- Sub Saharan Africa faces significant problems in the provision of health services and education. Until recently, there has been little reason to hope for the development of information services in the region (Hill 1994).

- Sub Saharan Africa has the world's highest illiteracy rate, especially among women (UNECA 1996).

- Sub Saharan Africa has got low numbers of teachers and large numbers of students per class. There are few schools and universities (UNECA 1996).

- There is general lack of educational materials, few libraries, very limited access to international journals, lack of researchers and research facilities (UNECA 1996).

Most Sub Saharan African countries have adopted Structural Adjustment Programs (SAP) designed to bring about economic recovery (World Bank 1996). Foreign aid is often made available if governments promote domestic production, reduce imports and depend less on national borrowing. Governments have thus committed themselves to reducing expenditures and to stop wasteful spending. This has meant reduction in spending in real terms on higher education (Hill 1994). Since most universities in the region are supported by governments, they are facing serious financial problems in this period of economic retrenchment.

However, Jugessor and Hamel (1995) said that surprising enough, the present development crisis in Sub Saharan Africa is not matching with the huge endowment of her natural resources.

At the moment, Sub Saharan Africa faces a double dilemma, that is; to meet unmet demand for basic services, a product of years of neglect, while simultaneously developing new sophisticated networking capabilities.

Many governments in Sub Saharan Africa have probably realised the need for developing the information and telecommunication sector of their countries. Its in line with this that in May 1995, the twenty-first meeting of the ECA conference of ministers consisting of the fifty-three African ministers of Social and Economic Development and Planning, adopted resolution 795(XXX) entitled "Building Africa's Information Highway". In response to this resolution, a high-level working group on information and telecommunications technologies in Africa was appointed to draft an action framework to utilise the information and communications technologies to accelerate the socio-economic development of Africa and its people. The result of this group was the Africa's Information Society Initiative (AISI), an action frame work to build Africa's information and communication infrastructure (UNECA 1996).

The contribution of Sub Saharan African countries on the Internet is still on a lower side. The Africa Policy Information Centre (1996) commented on the issue of Africa's content on the Internet, that with the exception of South Africa, the majority of information and massages about African countries and issues on the Internet still comes from host computers in western countries. There are still very few Africa-based Web Sites with the exception of South Africa.

3.3 INTERNET CONNECTIVITY IN SUB SAHARAN AFRICA

Jensen (1997) reported that by December 1997, 47 of the 54 nations in the African continent had some sort of Internet access either a local dial-up store and forward e-mail service with a gateway to the Internet, or a full leased line service. Countries in Sub Saharan Africa that had achieved live Internet public access services in the capital cities include: Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Central African Republic, Cote d'Ivoire, the Democratic Republic of Congo, Djibouti, Equatorial Guinea, Ethiopia, Gabon, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, Reunion, Senegal, Seychelles, South Africa, Sudan, Swaziland, Tanzania, Chad, Togo, Uganda, Zambia, and Zimbabwe.

Jensen (1997) further reports that as a result of various international and national initiatives, its expected that many of the remaining capitals will also shortly have full Internet facilities. By 1997, plans were in place in the Republic of Congo, Gambia, Liberia, Sierra Leone, Cap Verde, and Sao Tome e Principe, thus leaving only 3 countries with capital cities that remain without full Internet access or any known plans for achieving full Internet connectivity, namely Comoros, Eritrea and Somalia.

There is an indication of maturity of the Internet service provision sector given by the number of Internet Service Providers (ISPs) competing with each other in some

countries. Most capitals with Internet access have more than one Internet Service Provider and 9 countries have particularly active and mature markets. These are Cote d'Ivoire, Ghana, Kenya, Nigeria, Senegal, Tanzania, Uganda, Zimbabwe and South Africa, which is among the top 15 countries in the world when ranked by number of Internet nodes. The countries with only one full public access Internet Service Provider after 12 months were: Burkina Faso, Central African Republic, Ethiopia, Mauritius, Niger and Seychelles. Burkina Faso, Mauritius, Mauritania, Senegal, South Africa, Chad and Zimbabwe have local dial-up access in the whole country, while Angola, Benin, Botswana, Ghana, Kenya and Tanzania have got Internet services in the second major cities.

3.4 PROBLEMS AFFECTING INTERNET CONNECTIVITY AND USE IN SUB SAHARAN AFRICA

3.4.1 Poor telecommunication infrastructure

A number of individuals have written about the poor communication infrastructure in Sub-Saharan Africa. According to Lishan Adam (1996), the two major difficulties in Africa in embracing electronic communications are its low levels of infrastructure and regulatory barriers. Africa lacks the most basic telecommunications infrastructure and this makes most efforts in Africa challenging. The gap between Africa and the

developed world continues to widen. Jensen (1997) says that since the Internet depends on the quality of the underlying telecommunication infrastructure, the poor quality of the network still remains a basic impediment to rapid growth in Internet use. The poor telephone lines and their restriction to major cities have seriously impeded both quality and coverage of Internet access in many Sub Saharan African countries. While most African countries are experiencing some extension and modernisation of their telecommunication networks, Sub-Saharan Africa's teledensity has continued to remain at less than one per 200 inhabitants, most of the telecommunication network is analogue and many sections are highly unreliable, especially during the rainy season. On a regional basis, Africa has the least developed infrastructure with only 2% of the world's telephones and 12% of the population, compared to other developing regions. Meanwhile Wendy (1994) reported that the 660 million inhabitants of the continent have access to just under 110 million main lines for telephone. He goes further to say that Sub-Saharan Africa has around 0.04 main lines per 100 people, which is just 10% of the telephone density of Asia and less than 1% of the telephone density of the developed countries. Further more, South African Deputy President Thabo Mbeki remarked in 1995, that there were more telephones in Manhattan than in all Sub-Saharan Africa. The situation in Sub Saharan Africa is made worse by the fact that most telecommunication companies are run as public utilities, that neither face hard budget constraints nor worry much about consumer satisfaction (Kaji 1996).

However there is a high level of variability between African countries in the state of

their existing telephone networks. Some countries have made telecommunications a priority and are installing digital switches with fibre optic inter-city backbones and the newest cellular and mobile technology. For example, among the world's most sophisticated national networks are in Botswana and Rwanda where 100% of the main lines are digital, compared with 49.5% in the United States of America. On the other hand, countries like Madagascar and Uganda have highly unreliable analogue telephone systems and poor national links between urban centres. Some countries such as Mali, Niger and the Democratic Republic of Congo have only 1 telephone line for every 1000 people (Jensen 1997)

3.4.2 High cost

Costs relating to Internet connectivity and use fall into two major categories, namely, telecommunication costs and Internet subscription costs. Wendy (1994) reported that on average, Africans who have access to a telephone line spend about 900$ per year on telecommunication services, which is 50% higher than that of western Europe. Jensen (1997) also says that reflecting the high telecommunication costs and small markets, often supplied by a single operator, charges for dialup Internet access are generally higher in Africa than else where. He reports that the average cost of a low volume Internet account in Africa is about $65 per month when using a basket of the lowest priced services in each country, which in some cases is just e-mail. The markets and policies are so immature and this is reflected by costs varying greatly say from $10 to

$150. The high charges mean that even if a computer is available, the service is beyond the reach of the majority of the population.

3.4.3 Bandwidth limitations

Access to sufficient bandwidth for carrying out interactive activities over the Internet is also a major problem in Sub Saharan Africa. A few of the international connections to the Internet still operate on analogue circuits rated at 9.6 Kbps, but often pushed to 14 Kbps and sometimes 24 Kbps. By late 1997, very few countries outside South Africa had international circuits larger than 64 Kbps, but 128 Kbps connections were becoming increasingly common. 256 Kbps were only present in Ghana, Kenya, Senegal and Tanzania. Most of the connections are carried via satellite. However, countries having borders shared with South Africa have lower cost terrestrial links and this has resulted in most of the Internet Service Providers in the neighbouring countries connecting to the South African infrastructure (Jensen 1997).

3.4.4 Problem of content

Jensen (1997) reported that most countries in Africa have some form of local or internationally hosted web server with varying degrees of comprehensiveness but the quantity of information is generally very limited when compared to equivalent sites in

the developed countries.

3.4.5 Restrictive government regulations

Government policies in Sub Saharan African countries are also limiting the growth and development of the Internet in the region. In many of these countries, there is a feeling that access to information may compromise stability. In Kenya for example, early in 1996, Kenya Posts and Telecommunications Corporation leased lines to two Internet Service Providers and a week later, a cautionary note appeared in the local press urging those companies not to use the lines for purposes of providing Internet services (AAAS 1996).

Another example is that of Ethiopia, where the state monopolised the telecommunications services and by 1996, the PADIS network, which had grown into one of Africa's most robust electronic network systems, comprising 500 sites and more than 3,000 users, terminated its services and consequently stranding thousands of PADISnet users (AAAS 1996). Internet services are provided solely by the government. In other countries, the situation is not any different and where we have private Internet Service Providers, the taxes are quite high.

Other problems affecting Internet connectivity and use in Sub Saharan Africa are: low level of skill development and apathy among the general population.

3.5 PROSPECTS FOR INTERNET DEVELOPMENT IN SUB SAHARAN AFRICA

Jensen (1997) mentioned a number of potentially influential activities that may help Sub Saharan African countries deal with the problems encountered in relation to Internet connectivity and use. These projects include:

- The UN Secretary General's System-Wide Initiative on Africa, which includes Information and Communication Technologies as one of the major components in a $11.5 million program called "Harnessing Information Technology for Development" supported by the various United Nations partners.

- The $15 million Leland Initiative aiming to provide about $0.5 million per country to assist with developing Internet connectivity in 20 African countries in return for agreements to liberalise the market to 3rd party Internet Services Providers and to adopt policies which allow for the unrestricted flow of information. Assistance is in the form of equipment, expertise, training and free circuits for the first year.

- The International Telecommunications Union's program for Africa resulting from the 11 million SFr profits from Telecom 95, as well as various rural, community telecentre, health and satellite projects emanating from the Buenos Aires Action Plan being conducted in co-operation with UNESCO, IDRC, WHO and others.

- IDRC's Acacia program which has obtained Canadian $60m over the next 5 years to develop the use of Information and Communication Technology in communities in Africa.

- The commerce-oriented trade point initiatives of UNCTAD which has made Africa the priority region for the next two years. UNCTAD has obtained a commitment from the European Union for ECU 30 million for the regional development of local trade efficiency networks in Africa.

- The multi-donor InfoDev fund being established by the World Bank, which has approved the $500 000 South African Telematics for African Development Consortium and the $1 million African Virtual University Project.

- UNESCO's IIP program, which has already (with funding from the Italian and Dutch Governments) been executing the RINAF (Research and Information Network for Africa) project in about 10 African countries, including Mozambique, Senegal, Swaziland and Zambia.

- The Department of Foreign Affairs of the Netherlands is considering funding high bandwidth Internet connections to universities in 8 African countries including Burkina Faso, Eritrea, Mozambique, South Africa, Tanzania and Zambia.

- UNDP's Africa Bureau has agreed to a $6m fund to improve Internet connectivity in Africa, in a project called the Internet Initiative for Africa (IIA). The Countries concerned are: Angola, Burkina Faso, Cap-Verde, Gambia, Mauritania, Namibia, Nigeria, Democratic Republic of Congo, Sao Tome et Principe, Swaziland, Chad and Togo.

- UNDP's SDNP is assisting with local telematics network development in many African countries including Angola, Cameroon, Benin, Mauritania, Mozambique and Chad.

- USAID's RCSA office and its Productive Sector Growth & amp; Environment Office of the Africa Bureau has launched the Africa Link project which will fund equipment, training and some communications costs to connect about 100 African institutions to local e-mail service providers.

- UNEP's Mercury project uses VSAT technology to establish an environmental information exchange network in Africa. UNEP is co-operating with the ITU to examine the possibility of using the spare bandwidth of the network for other functions.

- The UN Office for Outer Space Affairs is proposing the COPINE project to donate ground stations and transborder time to African research institutions.

3.6 INTERNET IN UGANDA

3.6.1 History

According to Mugambi (undated), the introduction of electronic communication to Uganda started at Makerere University in May 1991 as a spin-off from an IDRC sponsored project at the Institute of Computer Science. The idea then was to experiment with computer based communication modalities by setting up nodes at the leading universities in the East and Southern African Region under the auspices of an academic and research network (ESAnet).

The mandate of MUKLA was extended to cover Non Government Organisations within the scope of another IDRC funded Healthnet project whose aim was to facilitate communication amongst health professionals within the African region with their peers elsewhere. MUKLA's services were based on electronic mail, using the Fidonet "store and forward" communications technology. MUKLA started routing international traffic through the GreenNet's GnFido node in London in 1993 with four polls a day.

from the Internet. The most notable among these was Ugandanet, a discussion list on Uganda-related issues and news. Through this conference, over 600 Ugandans from all over the world would link with each other on a daily basis. However, MUKLA closed down its operations in 1997 and subscribers had to find ways of finding other service providers or else do without (Komakech, Pers. Comm.)

3.6.2 Present state

Today, Uganda is reported as one of the countries in Africa having Internet Service Providers with particularly active and mature markets (Jensen 1997). Uganda has got four Internet Service Providers, namely: Starcom (U) Ltd., InfoMail (U) Ltd., Bushnet Ltd. and Swift Global Ltd. However, InfoMail (U) Ltd. and Starcom (U) Ltd. were reported to have plans of merging their operations by the end of April 1998 (Busharizi 1998).

Meanwhile, following the liberalisation of the telecommunication sector in the country, a South African company, Mobile Telephone Network (MTN) obtained a license to operate a second communication network including Internet in Uganda (Busharizi 1998). Another company, Uganda Telecom Ltd. (UTL) is also set to provide Internet services in the country (Adongo, Pers. Comm.).

Currently there is no limit as to how many Internet Service Providers Uganda should have. According to an interview with Mr. Jonathan Banturaki of the Uganda

Communications Commission (UCC), the telecommunication act is open and any one interested can provide the service. However only MTN and UTL are licensed to provide leased lines and gateways to other Internet Service Providers, despite the fact that Starcom (U) Ltd. already has its VSAT connection which terminates in Norway and goes by marine cable from there to Digex Corp. in New York. This provides prospects to universities in the country to venture into the Internet service Provision business as is being done by the University of Zambia.

3.7 SUMMARY

This chapter has presented an overview of Sub Saharan Africa looking at the various factors that characterise it. Further look has been made on the state of Internet connectivity in the region. The problems and prospects relating to Internet connectivity and use in the region have been discussed followed by the case of Uganda where the development of Internet connectivity over the years been given including the present state.

CHAPTER FOUR

4.0 INTERNET CONNECTIVITY AND CONTENT GENERATION IN SUB SAHARAN AFRICAN UNIVERSITIES

4.1 INTRODUCTION

This chapter discussed the state of Internet connectivity in Sub Saharan African universities, followed by a review of the information that these universities have on the World Wide Web. The findings presented are a result of browsing the World Wide Web. They relate to: the number of universities in Sub Saharan Africa that have Internet access, those having information on the World Wide Web and what information there is. Universities that had information on the World Wide Web together with their Uniform Resource Locators are listed in appendix 2

4.3 INTERNET CONNECTIVITY IN SUB SAHARAN AFRICAN UNIVERSITIES

AAAS (1997) provided a list of Sub Saharan African Universities that were known to have some level of (direct or dial-up) Internet access and Home Pages on the World

Wide Web by October 1997. Meanwhile Jensen (1997) also reported the same situation by December 1997 and added on that Universities in most Sub Saharan African countries had e-mail connectivity at a minimum, and about 10 universities already had full Internet connectivity by December 1997. These universities are:

- University of Angola;
- University of Botswana;
- Universite' Nationale de Cote d'Ivoire;
- University of Ghana, Legon;
- University of Namibia;
- Universite' de Re'union (Reunion);
- Universite Cheikh Anta Diop de Dakar (Senegal);
- University of Dar Es Salaam (Tanzania);
- Makerere University (Uganda);
- University of Zambia.

This situation may have changed by the time this document was being prepared.

Internet facilities at most of the universities are restricted to staff. Post graduates are often able to obtain access but the general student population is usually without access (Jensen 1997).

4. 3 SUB SAHARAN AFRICAN UNIVERSITIES ON THE WORLD WIDE WEB

At http://www.agola.stm.it/university/afuni.htm, a number of Sub Saharan African countries with universities having content on the Internet were listed. The countries included: Angola, Benin, Eritrea, Ethiopia, Ghana, Kenya, Malawi, Mauritius, Nigeria, Somalia, South Africa, Sudan, Uganda, Zambia and Zimbabwe.

However, by carrying out searches on the Web, it was found out that actually very few universities had Web Sites. These included the University of Namibia, University of Ghana, Kumasi, Dar Es salaam University and Makerere University which had a page designated "the official page of Makerere University" and had been last updated in September 1997.

Generally, the contents of these pages included general information about the University , the library, university programs, student facilities, admission requirements and Information Technology resources. The universities of Ghana and Namibia had comprehensive coverage with the University of Ghana, Kumasi having a Web Page on Research units and Projects which listed the various research centres under the University. Cuttington University College in Liberia gave information about the college's history and immediate needs of the College, which included vehicles and restocking the library.

Other universities had Web pages prepared in the developed countries as was the case for the faculty of Health sciences, Moi University in Kenya. This page is prepared by an individual in the United States of America. More details about the history, mission and academic programs at Moi University are also given. The University of Nairobi and the University of Zambia had their information prepared by the International Centre for Distance Learning (ICDL), the Open University.

In other cases, Web Pages were prepared by a department or faculty within the University. This was the case for the University of Malawi, for which the brief information there is, is prepared by the Department of Economics. Although its indicated that "this is not an official page of the University of Malawi", this page was last updated in April 1998 and includes information concerning officers of the University, the University calendar, research, admission and general information about the University. Detailed information is only given for the Economics Department. The Web Page for the Polytechnic University of Malawi was also designated "not an official page" and included Academic departments, Institutes and Research centres, course and admission information.

Some universities are making efforts to develop Web pages, just like the University of Khartoum in Sudan which had its page under construction with a page on scholars and researchers whose list includes libraries and information centres found in other parts of the world, for example; Library of Congress, New York Public Library and British

Library. It also offers a guide to the university library and resources for scholarships.

Provision of wrong hyperlinks was also one characteristic of some of the Web Pages browsed. Consequently, search engines would return errors at times. This was the case for the University of Sierra Leone, the Polytechnic University of Malawi and the national University of Lesotho. In addition to this, the e-mail addresses provided were also not correct as was the case for Makerere University whose e-mail address must have changed since the closure of MUKLA business at the University. (see section 3.4.1)

4.4 SUMMARY

The conclusions that can be drawn from the findings above are as follows:

- Very few universities in Sub Saharan Africa have made an effort to develop Web Pages for their universities and those that have tried have very brief information provided.

- Sub Saharan African universities still rely so much on the developed world for providing information on the Internet.

CHAPTER FIVE

5.0 INTERNET AND MAKERERE UNIVERSITY ACADEMICS

5.1 INTRODUCTION

This chapter presents the findings of the survey that was conducted at Makerere University in order to answer some of the questions that this study addressed. A questionnaire (see appendix 3) was used to collect data from Academics at Makerere University. A total of 185 questionnaires were distributed out of which 134 (72.4%) were returned. Out of these, 6 were not filled in as required and were therefore not considered for the data analysis. Therefore the results presented were taken from 128 questionnaires that were found to be usable. Data was analysed using tabulation and simple percentages (Kothari 1985). All percentages have been rounded off to the nearest whole number. The findings from the questionnaire are supplemented by results of interviews conducted with some few Academics where necessary.

5.2 BACKGROUND TO MAKERERE UNIVERSITY

According to the Makerere University Prospectus (1997) and Macpherson (1966), the history of Makerere University dates way back in 1921 when the Uganda government established a technical college on Makerere hill. In 1922, the title of the institution was changed to Makerere College with the incorporation of medical courses from Mengo hospital medical school, the inauguration of courses in Agriculture, Veterinary science, Elementary engineering, Survey and Teacher training.

In 1937, a commission recommended that the college becomes the centre of higher education in East Africa. It was to become a university college and eventually a university. This marked a turning point in the evolution of Makerere as an international centre of learning. The college assumed the title of the University of East Africa in 1949 with courses leading to the award of general degrees of the University of London in Arts and Science instituted at the beginning of 1950. In December 1953, the first examinations for these courses were held and 13 out of the 14 candidates were successful.

In addition to the development of the teaching side, there was an increase in provision for research in all departments of the university. This research extended to East Africa and beyond.

With the establishment of the university of East Africa, in 1963 the period of special relations with the University of London stopped and degrees of the University of East Africa were instituted. Makerere became a national university in July 1970.

In 1972, with the declaration of the economic war, all the expatriate staff left the University and these were followed by many senior Ugandan teachers. The University library, which is supposed to be the national reference library, was also affected. The inadequate funds allocated to the university were not enough to buy books and to finance research. The University library was cut off from the outside World; the supply of periodicals ceased and foreign donation of textbooks stopped. Currently, books and journals are either scarce or outdated. Professor Nsibambi, a political scientist and former director of the Makerere Institute of Social Research (MISR) said:

"It was impossible to run Makerere efficiently because the state could not fund university education... You don't have enough reading materials. How can you teach when you don't have the tools. It is a question nationally, but also regionally and continent wide."

Presently, Makerere University is going through a rejuvenation characterised by many dramatic changes aimed at not only bringing it back to its former glory but also transforming it through a modernisation process into an academic giant among institutions of higher learning in Africa and beyond (Hyuha 1998). The university

provides courses leading to 39 awards and enrols about 7700 students every year.

In recognition of the growing role of computerisation, the University set up a special committee called the Computer Management Committee charged with the responsibility of recommending to the University senate, matters relating to computer resources and services within the university. The institute of computer science was also established in 1985 and offers training programs in computer science and skills. In April 1996, Makerere University main library introduced Internet services to the university community and as reported by Musoke (1995), the main objectives for this were to:

- allow professors and lectures get latest information on research and development; and
- be able to feed research findings into the network.

5.3 INTERNET USE BY MAKERERE UNIVERSITY ACADEMICS: SURVEY RESULTS

5.3.1 Number of respondents according to faculty/ institute/ centre

The number of responses according to faculty/ institute/ centre are presented in the table below.

Table 5.1 Respondents according to faculty/ institute/ centre

Faculty/ institute/ centre	**No. of questionnaires sent**	**No. of questionnaires returned**	**Percentage returned**
Agriculture and Forestry	24	17	71
Arts	24	16	67
Commerce	4	3	75
Education	18	13	72
Law	7	0	0
Science	29	26	90
Technology	18	11	61
Veterinary Medicine	16	12	75
Adult & Continuing Education	5	3	60
Library and Information Science	2	2	100
Statistics and Applied Economics	10	7	70
Industrial and Fine Arts	6	5	83
Social Sciences	21	18	86
Environment and Natural Resources	1	1	100
TOTAL	**185**	**134**	**100**

Response was poorest in the faculty of Law and this was because the Academics in this faculty gave excuses of being busy. There is also a likelihood that Academics in the faculty of Law do not use the Internet. This is based on the assumption by Lazinger, Bar-llan and Peritz (1997) saying that non-respondents are likely to be non-users. However, 100% responses from the East African School of Library and Information Science and the Institute of Environment and Natural Resources are due to the small number of Academics there and therefore very few questionnaires were sent accordingly.

5.3.2 Personal Data

5.3.2.1 Number of respondents according to gender

The number of respondents according to gender are presented in table 5.1.

Table 5. 2: Number of respondents according to gender

Gender	No. of respondents	Percentage
Male	86	67
Female	42	33
TOTAL	**128**	**100**

5.3.2.2 Positions held by Academics

Respondents were required to indicate the positions they hold and the results are presented in table 5.3.

Table 5. 3: Number of respondents according to positions held

Position	No. of respondents	Percentage
Assistant Lecturer	26	20
Lecturer	42	41
senior Lecturer	27	21
Associate Professor	19	15
Professor	4	3
TOTAL	**128**	**100**

5.3.3 Use or Non use of Internet

Respondents were required to indicate whether they had used the Internet before or not by putting a tick against the options given (YES or NO). The results are presented in table 5.4.

Table 5. 4: Number of respondents according to use or non use of Internet.

Used the Internet before?	No. of respondents	Percentage
YES	49	38
No	79	62
TOTAL	**128**	**100**

5.3.3.1 Internet use by faculty/ institute/ centre

Academics were grouped according to their faculties/ institutes and centres so as to show the level usage among various academic units. Table 5.5 shows the results.

Table 5.5 Internet use by faculty/ institute/ centre

Faculty/ institute/ centre	No. of users	Percentage of users per faculty	No. of non-users	Percentage of non users per faculty
Agriculture and Forestry	11	65	6	35
Arts	8	50	8	50
Commerce	2	67	1	33
Education	6	46	7	54
Science	9	31	20	69
Technology	0	0	11	100
Veterinary Medicine	2		10	83
Adult & Continuing Education	3	100	0	0
Library and Information Science	2	100	0	0
Statistics and Applied Economics	0	0	7	100
Industrial and Fine Arts	1	20	4	80
Social Sciences	4	22	14	78
Environment and Natural Resources	0	0	1	100
TOTAL	**49**	**38**	**79**	**62**

All respondents from the faculty of Technology, the Institute of Statistics and Applied Economics and that of Environment and Natural Resources were Internet non users. However, with the exception of the faculty of Technology, the rest of these institutes are

not located far from the main library and therefore proximity cannot justify their non-use. Probably, there is a relationship existing between one's discipline and Internet use although this was not confirmed by this study.

Internet use was highest in the Centre for Adult & Continuing Education and the East African School of Library and Information Science both of which depicted 100% usage. Since the Centre for Continuing Education co-ordinates the African Virtual University, Academics there have got no problem of access and their level of awareness of the benefits the Internet offers is likely to be higher than in other faculties. As for the East African School of Library and Information Science, usage was expected to be high since their discipline incorporates Internet as one of the aspects. The faculty of Commerce and that of Agriculture and Forestry have relatively higher levels of usage. This is probably because the faculty of Commerce has got Internet access while the faculty of Agriculture and Forestry is among the faculties located near the main library where Internet services are provided from.

5.3.4 Responses given by Non users of the Internet

The 79 respondents who indicated that they had never used the Internet before were required to fill in questions from a specific section of the questionnaire. The answers that they gave are presented in the following sub sections.

5.3.4.1 Alternative sources of Information for Internet non users

Respondents were required to indicate how they get information in their areas of specialisation and the results are presented in table 5.8.

Table 5.6: Alternative sources of information for Internet non users

Information sources	No. of respondents	Percentage
Journals & professional magazines	34	35
Books/ monographs	20	20
Conference proceedings	17	17
Conferences, seminars, workshops	6	6
CD-ROM	14	14
Other sources **	8	8
TOTAL	**99 ***	**100**

* Respondents gave more than one source of information hence a total of 99 has been uses as the base.

** Other sources of information mentioned included newspapers, radio, personal contact with colleagues and television. One respondent indicated receiving print outs of latest developments in his field from a friend in Germany every week.

5.3.4.2 Alternative means of communicating with colleagues

Respondents were also required to tick against the means of communication that they use to contact colleagues in the profession and the responses are presented in table 5.9.

Table 5.7: Alternative means of communication for non users of the Internet

Means of communication	No. of respondents	Percentage
Ordinary mail	35	44
Fax	7	9
Telephone	3	4
Personal contact	34	43
TOTAL	**79**	**100**

5.3.4.3 Reasons for not using the Internet

Respondents were required to indicate why they were not using the Internet by choosing from the available alternatives. Results are given in table 5.6.

Table 5.8: Reasons for not using the Internet

Reasons	**No. of respondents**	**Percentage**
Not knowing what the Internet is	13	17
Not aware of its existence at the University	16	20
Not aware of its usefulness	12	15
Lack of access	33	42
Other reasons *	5	6
TOTAL	**79**	**100**

* Some of the other reasons that were given are quoted as follows:

"It has not been possible for me to hook in though I have a computer";

"I can't afford to pay for it".

From the interviews conducted, a lecturer in the department of Biochemistry is quoted saying "*Access is restricted to bosses and particular individuals. Some people are told to pay about 10,000 shillings (approximately 10 dollars) for a month to use it. In town its equally expensive. To become a member is also not easy as subscription is a problem.*"

5.3.4.4 Interest in using the Internet

Non users were also required to indicate whether they were interested in using the Internet and all the 79 (100%) answered **YES.**

5.3.4.5 Ways of improving the Internet service

Respondents were requested to give some of their views relating to improvement of the Internet services at Makerere University so that they can be able to make use of the service. 67 (85%) of all the 79 that indicated that they were interested in using the service responded to this question and among the ideas that were given are:

- making the service available at departmental or faculty level;
- availing some of the information from the Internet that library personnel feel is important at faculty or departmental level;
- increasing access points in the library;
- increased publicity and creation of awareness;
- reduction in cost of the services;
- training users.

5.3.4.6 Access to the required hardware

Respondents (non users) were required to indicate what kind of hardware they had access to. The results are presented in table 5.7.

Table 5.9: Access to the required hardware

Hardware	No. of respondents	Percentage
Computer	39	47
Telephone	43	51
Modem	2	2
TOTAL	**84 ***	**100**

* Respondents indicated having more that one of the items indicated in the options given hence 84 was used as the base.

5.3.5 Use of the Internet

A different set of questions was meant to be filled in by those who indicated having used the Internet before as shown in section 5.3.2. These were 49 in number, hence for the results presented in the subsequent sub-sections, 49 is used as the base unless respondents selected more than one options.

5.3.5.1 Internet users by positions held

Respondents were grouped according to their positions so as to establish the pattern of use among different age groups. The results are presented in the table below.

Table 5.10 Internet users according to positions held

Position	**Age bracket**	**No. of users**	**Percentage of total users**
Assistant Lecturers	25-30	15	31
Lecturers	31-35	23	47
Senior Lecturers	36-40	3	6
Associate Professors	41-50	6	12
Professors	51-	2	4
TOTAL		**49**	**100**

Results indicated higher use among Academics at lower level positions, namely, Lecturers (47%) followed by Assistant Lecturers (31%). These comprised 78% of all the Academics that use the Internet. This finding probably confirms the statement that "*the more senior the person, the lower the Internet use tend to be*" (Lazinger, Bar-llan and Peritz 1997). Assistant Lecturers and lecturers fall in the age bracket of between 25 and 35 years. Even at the time of conducting the survey, younger Academics were more willing to accept an interview or to fill in the questionnaires. These results can also be explained by the fact that today, exposure to computers is much more among the lower age category of Academics than the higher age category.

The low level of Internet use by the Senior Lecturers is probably because they have reached the highest level they can achieve given their level of education. According to Makerere University, the highest level an Academic can achieve at a masters level education is "Senior Lecturer". Considering that scholarships for Ph. D studies are minimal, probably, these Academics are not so ambitious or are demoralised.

There is a relatively higher level of use among the Associate Professors at Makerere University. This is because at this level, Academics conduct a lot of research as they want to get promotion to the highest academic position in the university, that is, full Professor.

Professors constitute the lowest level of usage because their level of exposure to computers is very low. This is because by the time they had their studies, probably the majority never had a chance to touch a computer let alone seeing one. In addition to this, since they have reached the highest academic position, they may not bother so much about conducting research since they are probably fed up of it or are busy preparing for their retirement when they reach 60.

The conclusion that can be drawn from this pattern of use is that Internet use is more among the lower age category (Assistant Lecturers and Lecturers) of Academics than the higher age category (Professors).

5.3.5.2 Internet use according to gender

Internet users were grouped according to gender and the results are presented in the table 5.7 below.

Table 5.11 Internet use according to gender

Gender	No. of users	Percentage of total users
Female	9	18
Male	40	82
TOTAL	**49**	**100**

The low level of female Internet users is due to the small number of female Academics at Makerere University as compared to the males. Besides, the incentives for women to do research are still low considering the domestic responsibilities that they have to fulfil even when they have to do similar jobs like men. In addition to this, it is likely that female Academics are in disciplines that do not have a lot to do with Information Technology and may therefore not be compelled to use the Internet.

5.3.5.3 How did the Academics learn about the Internet?

Respondents were required to indicate how they got to learn about the Internet and the answers given are presented in table 5.8.

Table 5.12: How Academics learnt about the Internet

How Academics learnt about it	No. of respondents	Percentage
Studying or working abroad	5	10
Reading journals/ newspapers	7	14
Demonstration by an ISP	8	16
Radio/ TV advertisement	6	12
Heard from a colleague	13	27
others *	10	21
TOTAL	**49**	**100**

* Others included informal discussions with library personnel; personal inquiry; rumours and gossip and while attending a conference. Some respondents said they learnt about the service after they had the French Embassy connecting the department of French, Faculty of Arts.

5.3.5.4 **Access to Internet services in own offices**

Respondents were required to indicate whether they had access to Internet services in own offices or not. Responses are presented in table 5.13.

Table 5.13: Access to Internet services in own offices

Access to the Internet in own office?	No. of respondents	Percentage
YES	18	37
NO	31	63
TOTAL	**49**	**100**

5.3.5.5 Access to Internet services outside the University

Respondents were also required to indicate whether they had access to Internet services outside the university and the answers are summarised in table 5.14.

Table 5.14: Access to Internet services outside the University

Access to the Internet outside the University?	No. of respondents	Percentage
YES	15	31
NO	34	69
TOTAL	**49**	**100**

Those who answered YES to the previous question were required to mention the places where they had access to Internet services and some of the places mentioned included: The Crusader Newspaper, a Telecommunication company, National Environment Management Authority, Hope After Rape and friends' and own houses. While some of the respondents did not mention the places where they had access to Internet services, others mentioned more than one place.

5.3.5.6 Frequency of Internet use by the Academics

Respondents were required to indicate the frequency of use of the Internet and the answers that were given are presented in table 5.15.

Table 5.15: Frequency of Internet use by Makerere University Academics

Frequency of use	No. of respondents	Percentage
Everyday	4	8
At least once a week	23	47
At least once a month	19	39
Less than 5 times a year	3	6
TOTAL	**49**	**100**

5.3.5.7 Internet applications most frequently used

Respondents were given a list of Internet applications out of which they were required to tick against the one they used most. The number of responses per application are presented in table 5.16.

Table 5.16: Number of responses per Internet application

Internet application	No. of respondents	Percentage
Electronic mail	27	55
World Wide Web	16	33
Telnet	0	0
Listservs	0	0
File Transfer (FTP)	1	2
Discussion groups	2	3.5
Nil *	3	4.5
TOTAL	**49**	**100**

* Some respondents did not tick against any one of the applications.

5.3.5.8 **Reasons why Academics use the Internet**

Respondents were also required to tick against the reasons as to why they use the Internet and the number of respondents for each reason is given in table 5.17.

Table 5.17: Why Academics use the Internet

Reasons for using the Internet	**No. of respondents**	**Percentage**
Teaching purposes	10	18
Research purposes	18	33
Papers & presentations	9	17
Personal communication	15	28
Others	2	4
TOTAL	**54 ***	**100**

* some of the respondents gave more than one reasons and therefore 54 was used as the base.

The other reasons given for using the Internet included: keeping abreast with world affairs and latest information of interest.

5.3.5.9 **Level of satisfaction from using Internet services**

Respondents were required to indicate the extent to which they get satisfactory results from making use of the Internet and the results are presented in table 5.18.

Table 5.18: Level of satisfaction from using Internet services

Levels of satisfaction	**No. of respondents**	**Percentage**
75% to 100%	9	18
50% to 74%	22	45
25% to 49%	16	33
Below 25%	0	0
None at all	2	4
TOTAL	**49**	**100**

5.3.5.10 **Reasons for not getting satisfactory results**

Those who responded that they never get satisfactory results from the Internet services they make use of were required to give reasons why and these are quoted as follows:

" it takes me long to get information such that I end up giving up as I worry so much about the cost"

"I got very brief information that turned out to be unsatisfactory to my needs".

5.3.5.11 Comment on cost of Internet services at the University

Respondents were required to comment on the cost of Internet services provided by the University library. The comments according to number of responses are shown in table 5.19

Table 5.19: Comment on the cost of Internet services provided by the University library

Comment	No. of respondents	Percentage
Too much	29	59
Too little	2	4
Just right	6	12
No idea	12	25
TOTAL	**49**	**100**

5.3.5.12 How have the Academics benefited from using the Internet?

Academics were required to explain how they had personally benefited from using the Internet. Some of the responses given included:

- fast access to latest information;
- being able to reach colleagues faster;
- keeping up-to-date in one's area of specialisation;

- supplementing own research efforts;
- increase in frequency of communication and exchange of information;
- access to more bibliographic information;
- getting connected to the outside world at low cost;
- ease of preparing papers and presentations.

A senior lecturer who was interviewed in the Faculty of Veterinary Medicine is quoted saying: "*It [Internet] has made it possible for us to collaborate with other people, its a source of knowledge and current information.*"

Internet was also commended for making it easier for students to submit their assignments. A lecturer from the Institute of Computer Science said: "*Some of my students have actually handed in their work through e-mail.*"

5.3.5.13 **Problems associated with Internet services at the University**

Respondents were also required to mention some of the problems associated with Internet services at Makerere University. The problems mentioned relate to:

- accessibility;
- insufficient publicity of the service;
- lack of co-operation from library staff;

- high cost;
- lack of co-ordination as every faculty or department is getting connected by itself leaving those without enough funds without the service;
- short time allocated for searching;
- interference with telephone lines;
- lack of instant access as one has to book ahead of time;
- general lack of computers.

Those who were interviewed also showed dissatisfaction from Internet services provided at the University. One assistant Lecturer from the School of Education said that the search intermediaries in the main library are Internet illiterate. Meanwhile a Senior Lecturer from the Institute of Computer Science said it was illegal for the university library to sell the Internet services to the university community. Another professor from the faculty of Technology said: *"Although I have been with e-mail services through MUKLA and HEALTHNET on campus from 1991, my experience with Internet are through a private access supplier whom I chose after being frustrated by on-campus organisational and technical problems and incompetence."*

5.3.5.14 **Individual problems being faced**

Respondents were also requested to mention their individual problems as far as making use of the Internet is concerned. The problems mentioned included:

- lack of expertise in using the Internet;
- lack of access (some respondents mentioned having the Internet in their faculties/ departments but that it was only accessible to the dean or head of the department while others complained about the distance they have to walk from their respective offices to the library in order to make use of the Internet);
- high cost;
- lack of instant access as one has to book in advance in order to use the service;
- taking too much time logging into the network;
- lack of availability of original documents after getting the necessary references from the Internet;
- short time allocated for making searches.

5.3.5.15 **Suggested measures in order to improve the situation**

Respondents were required to suggest some of the measures they feel may help improve the situation. These are presented below.

- training Internet users;
- making the service available in departments/faculties;
- establishment of an Information Technology Centre with a good number of computers connected to the Internet at the University;
- publicity and creation of awareness;

- training library personnel;
- reduction in cost or if possible making the service free;
- informing users about incoming e-mail messages as soon as they are received;
- increase in time allocated for searching;
- increase in the number of computer terminals connected to the Internet in the main library;
- provision of instant technical assistance;
- improving the telephone system.

One Assistant Lecturer from the Department of Sociology suggested that the University finds ways of supporting the Internet service. He is quoted saying: *"The idea is that people should not pay. People should be fully connected. There should be no fear in people's minds while using [the Internet]"*

5.3.5.16 **Internet's contribution to universities in Sub Saharan Africa**

Respondents were required to give their view as to what they feel is the contribution of the Internet to Sub Saharan African universities. Those who responded to this question gave the following views:

- increased collaboration;
- improved curricula;

- improved quality of research; and
- improvement in quality of education.

5.3.6 The Internet as a facility for disseminating information

The Internet, through one of its powerful tools, the World Wide Web, can be used as a tool for disseminating information to the world. All the respondents to the questionnaire (users and non users) were required to tick against the kind of information that they felt should be given priority while developing Makerere University Web Page. The outcome of the responses is presented in table 5.20.

Table 5.20: Priority information for Makerere University Web Page

Information Item	No. of respondents	Percentage
General information about the University	24	19
Library system/ services	18	14
Student life	2	2
Faculty/staff information	18	14
Ongoing and accomplished research	62	48
Others *	4	3
TOTAL	**128**	**100**

* Others included conference announcements, study opportunities and scholarships.

5.4 SUMMARY OF FINDINGS

According to the responses given both through questionnaire and interview, the majority (62%) of Makerere University Academics had never used the Internet before while only 38% had used it before.

Those who had never used the Internet before provided the following information:

- 35% use journals and professional magazines as alternative sources of information;
- 44% use ordinary mail and 43% use personal contact as alternative means of communication;
- 42% gave lack of access as the limiting factor as to why they don't use the Internet while 17% did not know what the Internet is;
- 51% have access to a telephone and 47% have access to a computer.

Those who had used the Internet before provided the following information:

- 27% learnt about the Internet from colleagues;
- 37% had access to Internet services in their own offices while 63% didn't;
- 31% had access to Internet services outside the university while 69% didn't;
- 47% (majority) use the Internet at least once a week;
- Electronic mail is used most frequently by 55% of the Internet users;
- 33% use the Internet for research purpose while 28% use it for personal

communication;

- 45% get 50% to 74% level of satisfaction from using the Internet;
- 59% said the charges for Internet services provided by the University library are too much.

Academics who use the Internet indicated having benefited from using it in the following ways:

- faster access to up-to-date information;
- ease of communication with colleagues;
- improved quality of research;
- increase in frequency of communication and exchange of information;
- low cost connection to the outside world;
- ease of preparing papers and presentations;

Among the problems mentioned by the Academics in relation to utilising Internet services at Makerere University and individual problems being faced are:

- lack of access;
- insufficient publicity;
- incompetent intermediaries;
- high cost of services;
- lack of co-ordination;
- insufficient time allocated for making searches;

- poor telephone lines;
- lack of enough access points;
- lack of expertise in using the facility;
- lack of access to original documents after searching;

The recommendations provided by respondents in order to improve Internet services at Makerere University include:

- user training;
- decentralisation of the services;
- establishment of a co-ordinating body in the university;
- publicity and creation of awareness;
- training library personnel;
- reduction in costs
- increase in the number of access points;
- improvement in the telephone system;
- provision of instant technical assistance;
- increase in the amount of time for searching.

Based on the findings of the survey that have been presented in this chapter, the next chapter presents the conclusions of the study and recommendation that can be adopted.

CHAPTER SIX

6.0 CONCLUSIONS AND RECOMMENDATIONS

6.1 INTRODUCTION

This study attempted to answer questions outlined in chapter one at the end of section 1.2. Therefore, the conclusions derived for this study are based on these questions. In addition to this, the major problems that were identified are mentioned, followed by all the possible recommendations that can be adopted in order to improve the situation.

6.2 CONCLUSIONS

It was found out that a big number (62%) of the Academics that were covered by the survey had never used the Internet before. Only 17% of those that had never used the Internet before didn't know what the Internet is.

Internet use is highest in the Centre for Continuing Education and the East African School of Library and Information Science, it was relatively high in the faculty of Commerce and Agriculture and Forestry while it was poorest in the faculty of

Technology, the Institute of Statistics and Applied Economics and Environment and Natural Resources.

Internet use is more among the lower age category (Assistant Lecturers and Lecturers) of Academics than the higher age category (Professors). This confirms the statement that "*the more senior the person, the lower the Internet use tend to be*" (Lazinger, Bar-llan and Peritz 1997).

The percentage of female users is still very low since only 21% of all the female respondents were using the Internet.

The reasons why Academics don't use the Internet include lack of access, lack of awareness and too high cost for the service. The lack of awareness is consistent with the widely quoted statement by Brown (1994), the findings by Bane and Milheim (1995) and the conclusions by Adams and Bonk (1995) (see section 2.4). It also confirms the statement made by Kanamugire (1996) saying: "*many computerised information systems are burgeoning in many developing countries, but the target beneficiaries do not make maximum use of these systems since they are not aware of the potential benefits of using the systems.*"

A big number (47%) of Makerere university Academics use the Internet at least once a week and they use mainly electronic mail and the World Wide Web respectively. The

use of electronic mail by a big number of the Academics is consistent with the findings of previous research carried out at the Hebrew University of Jerusalem (Lazinger, Bar-llan and Peritz 1997) and is also consistent with the statement by Brown (1994).

Academics use the Internet mainly for research purposes and personal communication respectively. This is still consistent with the study by Lazinger, Bar-llan and Peritz (1997) which indicated that faculty members at the Hebrew University of Jerusalem used the Internet primarily for correspondence with colleagues about research issues. This finding also justifies the objectives for which the Internet was introduced at Makerere University (see section 5.2).

Most (45%) of the Academics that use the Internet indicated getting 50% to 74% level of satisfaction from using Internet services. This therefore means that since Academics get such level of satisfaction, then it would be necessary to devise ways and means of making it possible for those who are non users to benefit from the service. Besides, those who indicated not getting any satisfaction from using the Internet raised issues that can be addressed. These included high cost and too brief information received.

As to whether the interests of Sub Saharan African Academics are well represented on their universities' Web Pages, the results from the university Web Pages that were browsed showed that the majority give general information about the University, the library, university programs, student facilities, admission requirements and Information

Technology resources. However from the survey results at Makerere University, a big number of the Academics (48%) showed interest in having information about ongoing and accomplished research on their universities' Web Pages. Some universities like Moi University and the University of Zambia were found to have their Web Pages designed in the developed countries like USA and UK. This creates an information vacuum based on a statement made by White (1994) saying: "*many under-served areas [Sub Saharan Africa] receive knowledge that the developed world believes they should have, not that these areas would identify as the information they need*".

The major problems concerning Internet use by Sub Saharan African Academics that this study has identified are therefore concerning lack of co-ordination, low level of awareness and publicity, lack of access, high cost and insufficient content generation on the Internet. Bearing in mind a comment by Press and Rodriguez (1966) saying: "*while there are many constraints on the spread of networks in developing nations, we feel that the most important to overcome is the lack of a large, widely distributed, demanding, well-trained user community*", the following recommendations attempting to address the problems identified by this study are proposed.

6.3 RECOMMENDATIONS

6.3.1 Need for a co-ordinating office

The Internet must become embedded conceptually and institutionally in the current university systems and policies in Sub Saharan Africa. There is need for responsible offices to be established at universities in order to co-ordinate all issues pertaining to Internet and other IT-related aspects. Sub Saharan African universities, just like the rest of the world, have no choice but to forge a strategy and implement it since the development of an information infrastructure is a prerequisite for participation in the globalised economy (Wellenius et al. 1995).

Makerere University should have a co-ordinating body consisting of members from the Library, the Planning Department and the Institute of Computer Science. The role of such a body should be to oversee all aspects relating to the growth and development of the Internet at the University. This body should report to the University Senate or the University Council so that issues raised can easily be addressed at a higher level. The idea of having the library providing commercial Internet services and at the same time having departments and faculties getting connected by themselves causes problems because some people are left with no Internet access at all and the overall cost of Internet subscription is inflated. Internet services should be provided centrally with

guidelines in place to govern use and access. Establishment of a University Information and Communications Services Centre would be very useful in order to implement the decisions taken by the co-ordinating office.

6.3.2 Infrastructure development

In order to make the Internet accessible to as many Academics as possible in Sub Saharan African universities, there is need for building campus Intranets. An Intranet is a campus-wide information distribution system using Internet tools (Levitt 1996). This requires first of all building small Local Area Networks at faculty or departmental levels and these can be scaled to fully fledged campus Intranets. Internet connections are nice but they will be useless unless Local Area Networks are formed first (White 1994). Local Area Networks are venues for electronically shared research and teaching for the university community and play a crucial role in the development of information infrastructures.

Computers in various departments and branch libraries around the university can be linked together. Even the number of Internet nodes in the libraries should be increased to a reasonable number instead of having only one Internet node and users having to wait for hours before they can get access. Building Local Area Networks is likely to be possible for Makerere University since the results of the survey indicated that some

(47%) of the Internet non-users at least had access to a computer. There must be a way of making the Internet accessible to every one who has access to a computer, a modem and a telephone.

Given the poor telephone lines in Sub Saharan Africa (see section 3.4.1), an Intranet makes it possible for users to have access to the outside world through the Internet at reduced communication costs since it is built within a Local Area Network which does not require use of a telephone line. It also promotes collaboration among users (Lishan Adam 1997). This may therefore help to minimise the overall cost of Internet use at the University since there will be no need for various faculties and departments to pay directly to Internet Service Providers, and besides the telephone bill would be minimised. The idea of having Internet access restricted only to the senior officers or to those in higher positions may be eliminated.

In order to facilitate Intranet development, there is need to upgrade the Internet connection from a dial-up to a leased line as it is recommended to institutions that have a large number of Internet users to access the World Wide Web through leased lines (Faye 1997). Makerere University can either lease a line from an Internet Service Provider or even become an Internet Service Provider itself. According to AAAS (1993), the cost of a leased line is a fixed cost as it has no additional usage-based charges and eventually makes economic sense, after all, the number of potential users at the university is big enough based on the findings presented in section 5.3.3.4 where all

the Internet non-users indicated that they were interested in using the Internet.

Makerere University may explore the possibility of becoming an Internet Service Provider since the country's Telecommunications Act still allows for as many Internet Service Providers in the country as possible. Basing on the experience of MUKLA (see section 3.4.1), this may be possible. Being an Internet Service Provider is associated with such benefits like (White 1994):

- providing servers for electronic mail and Internet bulletin board services;
- possible to host local Web Pages for the university and the outside community;
- caching of Web pages that are very popular for users.

Alternatively, a satellite connection could be used as it has the ability to deliver large amounts of bandwidth and defeats geographical barriers (Evans 1997). The University can get connected via a satellite to a router which provides a terrestrial link to an Internet Service Provider. Once that connectivity is established, users will have access to the vast information resources of the Internet with ease.

Possibilities of integrating separate institutional efforts through information sharing should also be explored. One of the negative consequences of weak-to-nonexistent collaboration among universities and researchers is the failure to achieve a critical mass of users, so essential to successful network development (Carty 1997). Makerere

University may try the possibility of integrating its network with research organizations like the National Agricultural Research Organization (NARO), National Environment Management Authority (NEMA), Virus Research Institute (VRI), international organizations like Food and Agricultural Organization and Non Government Organizations. There is also need to build a large user base at the University.

6.3.3 Creation of awareness

In order to sustain Internet services at Makerere University, there is need for a sufficient user base (AAU/ AAAS 1993). Therefore, continued creation of awareness will open the door for many Academics to discover a technology that they will soon find indispensable. Awareness can be created using a number of techniques.

Newsletters, leaflets and brochures could be used as this is one way of gaining the interest of everyone who could be a user. Besides they are a means of promoting a service that will not cost a lot, will be welcomed by many users and need not take up a great deal of time (Hamilton 1990). Distribution of these products may take place in such places like the administrative assistants' offices, staff common rooms, senior staff club, library entrance and during public addresses. The only cost of leaflets, newsletters and brochures is staff time and stationery which can be afforded by the University at the moment. Hamilton (1990) commends this method as the cheapest and most effective publicity activity there is.

Posters may also be used in order to draw attention and to give brief information about the Internet. These can be put on notice boards in staff common rooms, faculties and clubs. Posters catch the eye as users walk along corridors and arouse uneasy feelings that perhaps users should drop in and see what sort of place produces such effective advertising (Hamilton 1990).

Public speaking, exhibitions and seminars plus audio-visual presentations may also be used.

6.3.4 Encouraging use of the Internet by Professors

There is need to encourage use of Internet services by the older Academics especially the professors. They should be trained on how to use computers so that they can become familiar with information technology. Professors also need to be informed about all the benefits of using the Internet as there is a tendency of seeing the Internet as just a means of communication and nothing more than that. All the benefits that the Internet can offer to the Academics should be made known to them.

6.3.5 Encouraging Internet use by female Academics

Since the percentage of female users as compared to the female respondents is still very low (21%), Internet use among the female Academics has to be encouraged by providing incentives like research grants, introducing them to female-related information on the Internet and offering basic training and assistance.

6.3.4 Creating among the Academics a culture of willingness to share resources.

Awareness and publicity should also include creating among the Academics a culture of willingness to share information and resources like computers. The old tradition of having Internet services accessible to only bosses and senior officers must be discouraged. Lishan Adam (1993) commented that one of the fundamental problems in some academic institutions is the lack of a culture for sharing information and resources. There is therefore a need to develop an information sharing culture among the university Academics.

6.3.5 Training

One of the critical factors in implementing electronic information services is user training and sensitisation (Kanamugire 1996). Therefore another issue that should be considered is that of training the Academics on how to use the Internet. There is need to create confidence in use of the Internet among the Academics. A confident user base, able to operate the technology, not only increases use and convenience to the user, but also benefits the information professional by freeing him from other more sophisticated professional responsibilities. Short courses can be conducted such as,

- What is the Internet?;
- How to use E-mail;
- How to find information on the World Wide Web; and
- How to create and maintain Web Pages.

Courses can be organized by the Institute of Computer Science in conjunction with the library and can be run over short periods of time for different categories of the academic community.

6.3.6 Repatriation of useful information

Academics must be encouraged to make use of the Internet. Its important to note that users will not communicate unless they have someone with whom to communicate (Robinson 1993). Therefore, its necessary to try to provide Academics with as much assistance as possible by tracking down useful e-mail and Web Site addresses. This is being practiced at the University of Zambia and can also be adopted by other universities in Sub Saharan Africa, including Makerere.

Furthermore, global information resources can be made available to the Academics by filtering popular archive materials from the Internet, through subscription to development related conferences, electronic journals and CD-ROM on-line public access catalogues (OPACS), and through exchange arrangements with the most popular World Wide Web Sites (Lishan Adam 1997). Effort can be made to repatriate specific resources and services and to make them accessible to the users. Such information could be maintained on campus web servers. The server could then be continually updated by information specialists who can browse global information resources and download the relevant information. The specialists would also develop information on net information (meta information) that enable users to locate sites or paths of useful information. In most cases, the difficulty on the Internet is the ability to find the search path for information. Information on global resources (where, how to gather, what quality of data, etc.) known as "net meta information" is still scarce (Lishan Adam 1997). Its

therefore recommended that the first step in making global information accessible to users is making network meta information available (Jensen 1995). Addresses of selected web sites can be made available to the Academics with brief descriptions of the information contained therein.

6.3.7 Developing strategies for cutting costs of Internet use by the Academics

Information should be regarded a public service and the idea of libraries making profits out of the Internet services should be discouraged. University Libraries should devise other means of covering the Internet charges because if they continue to charge for Internet services, then both universities and their respective libraries will have diverted from their initial roles and objectives. Besides the charges are too high for the Academics as indicated in section 5.3.4.9. Internet services can be sold to organizations outside the university as was being done by MUKLA and the university should pool resources and pay for Internet services and connections in order to provide access to the Academics. Alternatively, individual faculties can pay for their members of staff so that the Academics do not incur the costs directly.

6.3.8 Content generation

Sub Saharan African Academics should get involved in generating information to put on the Internet. There is need to encourage domestic information production especially through research. Local information resources like the library should be developed also. White (1994) commented that developing countries posses knowledge that the rest of the world needs and its through the Internet that it is possible to unlock this knowledge and make it available to the rest of the world. Besides, Africa's participation in content generation is fundamental for the sustainability of connectivity and for competitive advantage in the global economy (Lishan Adam 1997).

The following may be done in order to facilitate content generation:

- training the Academics in information organization in World Wide Web format. This training involves three steps as given by Lishan Adam (1997); namely, pencil and paper structuring, HTML editing and network navigation.

- setting up campus-based Web Sites for distribution of information to the outside world and within.

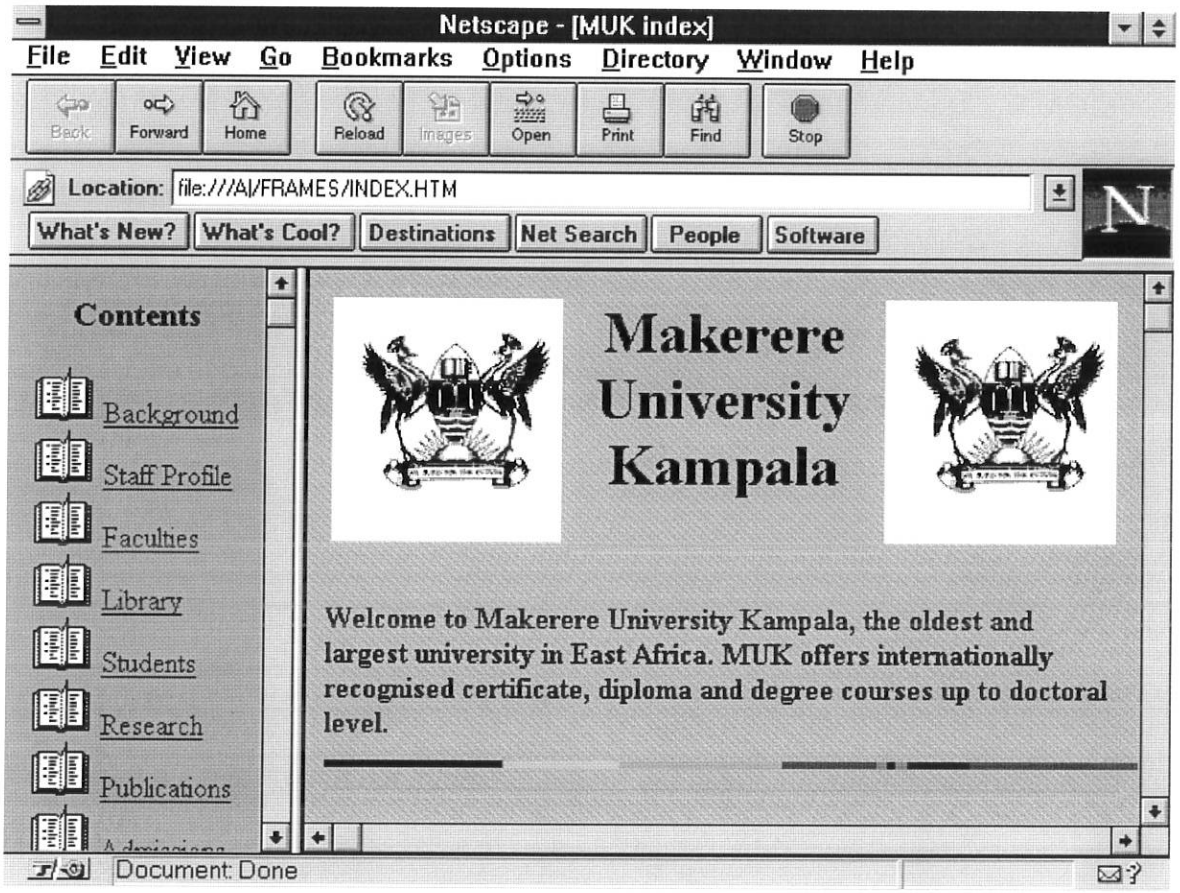
As an example to demonstrate this, a prototype Web Page has been designed for Makerere University. The contents of this page are based on the findings of the

questionnaire survey where most (48%) of the Academics preferred to have information about ongoing and accomplished research as their first priority on the Makerere University Web Page. In addition to this, it was found out that this information was equally missing on most of the universities' Web Pages that were browsed as discussed in Chapter five, section 5.5.

Its recommended that universities in Sub Saharan Africa provide information about their research activities containing the title, author and an abstract of the work. This may prompt users to subscribe or order for reprints of such work. Publications like annual reports and scientific journals can also be made available. For scientific journals, the title page and table of contents of each issue can be published on the web so as to prompt potential users to subscribe or order for reprints. This will help alleviate the problem of African Academics conducting research every year but not publishing it at all or having it relegated to the status of grey literature.

The welcome screen of the designed Web page for Makerere University is shown in figure 6.1.

Figure 6.1 Welcome screen for the proposed Makerere University Web Page



Other important links have also been added on to the designed Web Page. However, these may be altered from time to time as need arises. The important links added include:

- academic institutions affiliated to Makerere University, for example, Nakawa College of Business Studies, Kyambogo Polytechnic, Kabanyoro Agricultural College and Katigondo Seminary;

- other universities in Uganda, for example, Nkumba University, Uganda Martyrs University Nkozi, Christian University of East Africa, etc.;

- research institutions in Uganda, for example, National Agricultural Research Organisation and Virus Research Institute;

- universities in Sub Saharan Africa whose Uniform resource Locators are presented in appendix 2;

- sources of funds and scholarships for Academics, like IDRC, DAAD, the Common Wealth, etc.

- Discussion groups in Sub Saharan Africa which are of benefit to the Academic.

6.4 RECOMMENDATIONS FOR FURTHER STUDIES

The following further studies are suggested:

1. A more comprehensive study involving browsing the World Wide Web for a given length of time in order to monitor the frequency of updating Web Pages for Sub Saharan African universities, to establish the depth of information they provide as

compared to Web Pages for universities in other parts of the world.

2. A systems analysis and design study regarding building of Local Area Networks at Makerere University. This should also involve an information needs analysis.

3. Establishing the number of universities in Sub Saharan Africa that have Internet access, by contacting the concerned authorities in these universities.

4. Comparative studies about Internet use among different groups of people at the university, such as, graduate students, undergraduate students, administrative staff, information professionals, Academics in various faculties, etc.

5. There is also need for further studies to establish the relationship existing between various studies and Internet usage

6. Costs involved to implement the proposed recommendations have not been given.

7. Designing a more comprehensive Web Site for Makerere University.

6.5 CONCLUDING REMARK

Despite the vast resources of the Internet, the findings of this study have indicated that actually very few Academics at Makerere University are benefiting from it even when its available. The situation may not be any different from other Sub Saharan African universities. However, some of the issues raised can actually be addressed using the available resources. Sub Saharan African universities should therefore make use of the resources available and probably seek donor support where necessary so as to improve the situation.

BIBLIOGRAPHY

AAU/ AAAS 1993. Electronic networking for west African universities: report from the workshop Accra, Ghana, 15-17, 1993.

AAAS. 1995. Know Your Needs: Including E-mail and Information Support in Grants and Projects. Washington, DC: Sub-Saharan Africa Program.

AAAS. 1996. User's guide to electronic networks in Africa. 2nd., revised ed. Washington, DC.: Sub Saharan Africa program.

AAAS Sub-Saharan Africa Program. 1996. Going On-line: Internet and the African University. Washington, DC. 20005: The Program.

Abels, E. G., Liebscher, P., and Denman, D. W. 1996. Factors that influence the use of electronic networks and network services by science and engineering faculty in small universities and colleges. Journal of the American Society of Information Science. 47: 147-158.

Adams, J. A., and Bonk, S. C. 1995. Electronic information technologies and resources: Use by university faculty and faculty preferences for related library services. College and Research Libraries. 56: 119-131.

Africa Policy Information Center. 1996. Africa on the Internet: starting points for policy information. Washington, DC.: The Center.

Alexander, L. H. 1995. A study of Internet listservs as post-teleconference support to faculty at community colleges and two-year institutions. Ph. D diss. North Texas State University, Denton.

Ashley, N. W. 1995. Diffusion of network information retrieval in academia. Ph.D. diss. The University of Arizona, Tucson.

Bane, A. F., and Milheim, W. D. 1995. Internet insights: How academics are using the Internet. Computers in Libraries. 15: 32-36.

Bawden, David. 1990. User-oriented evaluation of information systems and services. England: Gower publishing.

Brown, J. M. 1994. The global computer network: Indications of its use worldwide. International Information and Library Review. 26: 51-65.

Bruce, H. 1995. Internet and academic teaching in Australia. Education for Information. 13: 177-191.

Busharizi, Paul. 1998. Infomail, Starcom merge. The New Vision. 13(65). Kampala: The New Vision Publishing corporation.

Carl-Mitchell, Smoot. 1997. What is TCP/IP? In Slone, John P (ed.). Handbook of Local Area Networks. 3rd. Ed. Boston: RIA Group.

Carty, Winthrop. 1997. Challenges to academic networks in Latin America: the case of Columbia's Red CETCOL. http://som1.csudh.edu/fac/lpress/devnat/nations/columbia/challen/

Chu, H. 1994. E-mail in scientific communication. In 15th national Online meeting: Proceedings-1994, New York, May 10-12, 1994. Medford, NJ: Learned Information.

Davis, Philip. 1995. Welcome to the World-Wide Web. Internet Librarian. January 1995: 51-55

Ekong, Donald. 1995. quoted in Telecommunication in Africa. Vrij Nederland. November 25 1995.

Ekwamu, Adipala. 1995. In UNECA and AAAS 1995.

Evans, Mitchel. 1997. The Net's Star turn. Communications Africa. June 1997: 56.

Faye, Makane. 1997. Africa and the Internet: A manual for policymakers, planners and researchers. [Unpublished]

Garret, H E. 1962. Statistics in psychology and education. Bombay: Allied Pacific Private Limited.

Gilster, P. 1994. Finding it on the Internet: The essential Guide to Archie, Veronica, Gopher, WAIS, WWW (Including Mosaic, and other search and browsing tools). John Wiley and sons.

Hamilton, Feona. 1990. Infopromotion: Publicity and marketing: Ideas for the Information professional. Aldershot: Gower.

Heslop, Brent and Angell, David. 1994. The instant Internet guide. Massachusetts: Addison-Wesley publishing co.

Hill, F. W. G. 1994. Strategic planning for university libraries: Welcome to workshop participants. In proceedings of a workshop on Survival strategies in African university libraries: New technologies in the service of information. Harare, Zimbabwe, 2-5 August 1993. Washington: AAAS.

Hyuha, Mukwanason. A. 1998. Makerere University graduation booklet 1998.

Jensen, M. 1995. Telematics for Africa in a global context: discussion paper. In: Proceedings of the African Regional Symposium on Telematics for Development. Addis Ababa: UNECA.

Jensen, Mike. 1996. The Internet and African National Telecom. [A Report].

Jensen, Mike 1997. Bridging the gaps in Internet development in Africa. http://www.mikej@wn.apc.org.

Jugessor, S. and Hamel, J. L. 1995. The Science and Technology Protocol of the African Economic Community. Addis Ababa: UNECA.

Kaji. 1996. Trade Telecommunications Services: Address at an Informal Ministerial Discussion, December 9, 1996 held in Singapore [http://www.gii.org/egi00219.html]

Kanamugire, Athanase B. 1996. Electronic information services and bibliographic retrieval education programs at King Fahd University of Petroleum and Minerals library in Saudi Arabia. International Information and Library Review 28 (3): 233-248.

Kothari, C R. 1985. Research methodology: methods and techniques. New Delhi: Wishwa Prakashan.

Koul, Lokesh 1984. Methodology of educational research. New Delhi: Vikas publishing house.

Kovacs, Diane K; Robinson, Kara L; Dixon, Jeanne. 1995. Scholarly E-Conferences on the Academic Networks: How Library and Information Science professionals use them. Journal of the American Society of Information Science. 46(4): 244-253.

Krol, Ed. 1994. The whole Internet: User's guide and catalog. 2nd. Ed. Sebastopol CA: O'Reilly and associates, Inc.

Krol, Ed. and Hoffman, Ellen. 1993. FYI: "What is the Internet?", RCF 1462. Available at FTP://ftp.nic.de/doc/rfc/rfc-1400 1499/rfc1462.txt.

Lazinger, Susan S., Bar-llan, Judith. and Peritz, Bluma C. 1997. Internet use by faculty members in various disciplines: A comparative case study. Journal of the American Society of Information Science. 48 (6): 508-518.

Levitt, L. 1996. Intranets: Internet technologies deployed behind the firewall for corporate productivity. In Proceedings of INET '96, Internet Society, Montreal, Canada, July 1996.

Lishan Adam. (1997). Content and the Web for African development. Journal of Information Science. 23(1): 91-97.

Lishan Adam. 1993. Sustainable academic networks in Africa: a system operator's perspective. In Electronic networking for West African universities, report from a workshop Accra, Ghana, December 15-17, 1993. AAU/AAAS.

Macpherson, Margaret. 1964. They built for the future: a chronicle of Makerere University College 1922-1962. London: Cambridge university.

Makerere University Prospectus 1996/97.

Mathews, Stephen A. 1995. Information technology, the Internet and the global population information network. Document prepared for the Global Population Information Network (POPIN) Information Technology Working Group and the Advisory Committee to be held in Bangkok, Thailand June 12th - June 21st 1995.

Moody, Glyn. 1996. The Internet with Windows. Oxford: Butterworth-Heinemann Ltd.

Musisi, Charles. 1996. MUKLA: Evolution of a homegrown network in Uganda. In Bridge Builders: African Experience with Information and Communication Technology. Washington, DC.: National Academy Press.

Musoke, David. 1995. Makerere to go Internet March. The New Vision 10(310). Kampala: The New Vision Publishing corporation.

Ocholla, Dennis N. 1996. Information-seeking behaviour of Academics: a preliminary study. The International information and library review. 28 (4): 348-358.

Richburgh, Keith B. 1994. Makerere: Harvard of Africa in collapse. The New Vision 9(137). Kampala: New Vision Printing Corporation.

Robinson, Neil A. 1993. The factors involved in creating a sustainable academic/ research network in Zambia. In Electronic networking for west African universities: report from a workshop Accra, December 15-17, 1993. AAU/ AAAS.

Rodriguez, Luis German, and Press, Larry. 1996. Toward an Internet census for developing nations. Http://csudh.edu/cis/lpress/devnat/general/index.htm.

Saracevic, Tefko. 1980. Perception of the needs for scientific and technical information in less developed countries. Journal of documentation 36(3): 214-267.

Slone, John P. 1997. The World Wide Web: Linking information across the globe. In Slone, John P (ed.). Handbook of Local Area Networks. 3rd. Ed. Boston: RIA Group.

Sparks, Donald. L. 1995. Economic trends in Africa South of the Sahara. In Africa South of the Sahara 1996. 25th Ed. London: Europa publications.

Starlight Communications (Uganda Limited). 1996. Internet/ E-mail (Brochure)

Teague, John H. 1995. Marketing on the World Wide Web. Technical Communication, Second, quarter 1995.

Telecommunications in Africa. In Vrij Nederland [Dutch weekly 25 November 1995]

UNECA. 1994. Africa in figures. Addis Ababa: UNECA.

UNECA. 1996. African Information Society Initiative (AISI): An action framework to build Africa's information and communication infrastructure. Addis Ababa: UNECA.

UNECA and AAAS. 1995. The needs and contributions of African researchers: Report from a workshop, Addis Ababa, Ethiopia.

Walsh, John P.; Bayma, Todd. 1996. The Virtual College: Computer-Mediated Communication and Scientific Work. The Information Society. 12: 343-363.

Wellenius et al. 1995. Implementing reforms in the telecommunications sector. Washington, DC.: World Bank.

White, Wendy D. 1994. Outreach programs for the information highway: designing programs for all. 7th International conference on planning the global information infrastructure agenda, Virginia, Nov. 18-20, 1994. Washington: National Research Council.

World Bank. 1996. Taking action for poverty reduction in Sub Saharan Africa: Report of an Africa region task force. Report No. 15575-AFR, Washington: World Bank.

APPENDIX 1

Faculties, Institutes and Centers included in the questionnaire survey; their number of Academics and Number of questionnaires that were distributed

Faculty/ Institute/ Center	Number of Academics	No. of questionnaires distributed
Agriculture and Forestry	93	24
Arts	94	24
Commerce	13	4
Education	70	18
Law	28	7
Science	116	29
Technology	70	18
Veterinary Medicine	61	16
Adult and Continuing Education	18	5
Library and Information Science	6	2
Statistics and Applied Economics	39	10
Industrial and Fine Arts	21	6
Social Sciences	83	21
Environment and Natural resources	1	1
TOTAL	**713**	**185**

APPENDIX 2

Universities in Sub Saharan Africa having information on the World Wide Web and their Uniform Resource Locators

University	Uniform Resource Locator
Bayero University, Nigeria	http://www.expovideo.com/bayero/
Catholic University of Angola	http://www.angola.org/politics/aeaf.htm
Cuttington University College, Liberia	http://cuttington.org/
Egerton University, Kenya	http://www.clarku.edu/departments/intdev'p/prog/egerton.html
Makerere University, Uganda	http://www.muk.ac.ug
Moi University, Kenya	http://www.tcol.co.uk/orgs/moi/moi.htm
Nairobi University, Kenya	http://www-icdl.open.ac.uk/icdl/database/africa/kenya/unairobi/prog/index.htm
National University of Lesotho	http://www.nul.ls/-size
Polytechnic University of Malawi	http://www.nsrc.org/AFRICA/MW/providers/uom.html
University of Asmara, Eritrea	http://rc.service.rug.nl/~ruiter/asmara/page1. htm
University of Ghana, Kumasi	http://www.ug.edu.gh/
University of Khartoum, Sudan	http://www.columbia.edu. ~tm146/Khar/Uofk. html
University of Namibia	http://www.globalaid.co.uk/technology/education/gla2/14/.htm
University of Sierra Leone	http://www.nsrc.org/AFRICA/SL/providers/usl.html

APPENDIX 3

Survey Questionnaire

ADDIS ABABA UNIVERSITY

SCHOOL OF INFORMATION STUDIES FOR AFRICA

P O BOX 1176, ADDIS ABABA

Dear Sir/ Madam,

I am a graduate student at the School of Information Studies for Africa (SISA), Addis Ababa University, Ethiopia. I am carrying out research on the topic: **"Internet and Sub Saharan African Academics with Particular Reference to Makerere University Kampala".** Internet refers to a network of networks which allows exchange of information around the world through the use of computers which communicate using the TCP/IP protocol. By making use of the Internet, one can have access to lots of information found on computers located in various places all around the world including exchanging information with millions of people all over the world.

This study is a requirement for the successful completion of the Master of Science in Information Science course offered at Addis Ababa University.

I am kindly requesting you to fill the attached questionnaire and I thank you very much in anticipation for your co-operation.

Yours Sincerely,

JOYCE BUKIRWA NYUMBA (Mrs.)

INSTRUCTIONS

For most of the questions, just put a tick against your choice. You may use additional paper if necessary.

SECTION I: Personal Data

Please indicate your answer by putting a tick in the space provided.

1. Gender:[ ]Male

   [ ]Female

2. Position:

   [ ]Assistant Lecturer

   [ ]Lecturer

   [ ]Senior Lecturer

   [ ]Associate Professor

   [ ]Professor

SECTION II: Use or Non Use of Internet

1. Have you used the Internet before?

   [ ]Yes

   [ ]No

If you have answered **YES** in the previous question, please go to **section IV.**

If you answered **NO**, please answer the questions in **section III.**

SECTION III: Non Use of the Internet

NB: This section should only be filled if you have never used the Internet before.

1. How do you get information in your area of specialisation?

   [ ]Reading journals, and professional magazines.

   [ ]Reading books/ monographs.

   [ ]Reading conference proceedings.

   [ ]Attending conferences, seminars, workshops.

   [ ]Searching CD-ROM

   [ ]Other sources (Please specify)

   _____

2. What means of communication methods do you use for contacting colleagues in the profession and others in your area of specialisation?

   [ ]Ordinary mail.

   [ ]Fax.

   [ ]Telephone.

   [ ]Personal contact.

3. What is/are your reason(s) for not using the Internet?

   [ ]I do not know what the Internet is.

   [ ]I am not aware of the existence of the service at the University.

   [ ]I am not aware of its usefulness.

   [ ]I do not have access to the service.

   [ ]Other reasons (Please specify) _____

4. Would you be interested in using Internet services?

[ ]Yes

[ ]No

5. If you have answered **YES** in the previous question, could you please give your view(s) as to how the situation can be improved in order to enable you make use of the services?

_____

6. To which of the following do you have access?

[ ]Computer.

[ ]Telephone.

[ ]Modem (This connects the computer to a telephone line to enable it communicate remotely with others even outside the country).

Please go to section V

SECTION IV: Use of the Internet

N.B. This section is to be filled if you have used the Internet before.

1. How did you learn about the Internet? (Please tick where applicable)

[ ]While studying or working abroad.

[ ]Read about it in a journal/ book/ newspaper.

[ ]Demonstration by an Internet Service Provider.

[ ]Radio/ television advertisement.

[ ]Heard about it from a colleague.

[ ]Others (Please specify)_____

2. Do you have access to Internet services in your office?

[ ]Yes

[ ]No

3. Do you use or have access to Internet services outside the University?

[ ]Yes

[ ]No

4. If your answer above is **YES** please mention the place/ office/ organisation where you make use of or have access to the service. _____

5. How often (on average) do you use the Internet?

[ ]Everyday

[ ]At least once a week

[ ]At least once a month

[ ]Less than five times a year

6. Which of the following Internet applications do you use most?

[ ]Electronic Mail

[ ]World Wide Web

[ ]Telnet

[ ]Listservs

[ ]File Transfer (FTP)

[ ]Usenet/ Newsgroups/Discussion groups

7. For what reason(s) do you use the Internet most?

[ ]For teaching purposes

[ ]For research purposes

[ ]Preparing papers and presentations

[ ]Personal communications

[ ]Others (Please specify)_____

8. To what extent do you get satisfaction from the Internet service(s) that you make use of?

[ ]75% to 100%

[ ]50% to 74%

[ ]25% to 49%

[ ]Below 25%

[ ]None at all.

9. If you have chosen the last option in question 8 above, what are the reasons for your answer?_____

10. Please comment on the cost of Internet services offered by the University Library

[ ]Too much

[ ]Too little

[ ]Just right

[ ]No idea

11. How have you personally benefited from using the Internet?

_____

12. In your view what are the problems associated with using the Internet services at Makerere University?

_____

13. What problems do you face personally while using the Internet?

_____

14. What measures would you suggest in order to improve the situation?

_____

15. What is/are your comment(s) about the contribution of the Internet to universities in Sub Saharan Africa?

_____

Please go to section V

SECTION V: The Internet as a facility for disseminating information

The Internet, through one of its powerful tools, the World Wide Web, can be used as a tool for disseminating information to the World. What kind of information would you give priority so as to be included on the Makerere University Web Page.

Please put a tick against the Item you think should be given highest priority.

[ ] General information about Makerere University

[ ] Library system/ services

[ ] Student life/ services

[ ] Faculty/ staff information

[ ] Ongoing and accomplished research

[ ] Others (Please specify)

Thank you very much for sparing your valuable time to fill in this questionnaire.

Please mail the filled in questionnaire to any one of the following addresses:

Joyce Bukirwa Nyumba **East African School of Library and Information Science,** **Makerere University** **P O Box 7062** **Kampala, UGANDA.**	**Joyce Bukirwa Nyumba** **School of Information Studies for Africa,** **Addis Ababa University** **P O Box 1176** **Addis Ababa, ETHIOPIA.**

APPENDIX 4

Interview guide questions for Academics at Makerere University

Part I Introduction, Are you familiar with the Internet?, Have you ever used it?

Part II

If no, why?

How do you get information in your area of specialization?

Would you be interested in using the Internet?

Do you have access to any of the required hardware for Internet access?

Part III

When did you start using the Internet?

How did learn about it and how to use it?

Where do you have Internet access?

How often do you use the Internet?

Which Internet application do you use most?

For what reasons do you use the Internet?

How are you benefiting from using the Internet? Any examples?

What problems do you face in relation to Internet use?

Could you comment on the contribution of the Internet to universities in Sub Saharan Africa?

What information do you think Makerere University should put on the World Wide Web?

APPENDIX 5

People in the Internet service provision sector and the telecommunication sector that were interviewed

Name of interviewee	Name of organization
Edward Balidawa	Starlight Communications (U) Ltd.
Richard Adongo	Uganda Telecom Limited
Jonathan Banturaki	Uganda Communications Commission
Peter Wagidebu	Swift Global (U) Ltd.
Gabriel Komakech	Makerere University Institute of Computer Science
Elly Gamukama	Makerere University main Library

APPENDIX 6

Interview guide questions for Uganda Telecom Limited and Uganda Communications Commission

What kind of assistance is in place for Internet Service Providers in Uganda?

What are your future plans for promoting Internet use in Uganda?

What plans do you have for improving the telephone system in Uganda?

Interview guide questions for Internet Service Providers in Uganda

1. When was this Internet service started and with what objectives?
2. What kind of Internet services do you offer?
3. What are the costs of the services at present?
4. Who are the major users of your services?
5. Do you have any facilities to enable Ugandans publish information on the World Wide Web? If so, what are the costs involved?
6. What problems are you facing and how do you go about solving them?
7. What are your future plans in relation to increasing the bandwidth and other related technologies?

APPENDIX 7

Examples of Listservs in Sub Saharan Africa

1. African-1 on listserver@listserv.cc.wm.edu
2. InterAfriq: Internet en Afrique on LISTSERVER@rio.org
3. AFRIK-IT on listserver@listserv.hea.ie
4. APC-Africa on Cmusisis@uol.co.ug
5. EAIA mailing list on Ben@dha.unon.org
6. Acacia list on listproc@internet.idrc.c
7. NLCITECH-CL-National Level Connectivity Information Technic Group on NLCI4A-CL@BELLANET.ORG
8. NLCI4A-CL- National Level Connectivity Information on riff@bellanet.org
9. ANI - CL - African Networking Initiative on riff@bellanet.org
10. AISI - HITD - CL - African Information Society Initiative/ Harnessing Information Technology for Development on riff@bellanet.org

APPENDIX 8

Countries of Sub Saharan Africa

Angola
Benin
Botswana
Burkina Faso
Burundi
Cameroon
Cape Verde
Central African Republic
Chad
Commoros
Congo
Cote D'ivoire
Djibouti
Equatorial Guinea
Eritrea
Ethiopia
Gabon
Gambia
Ghana
Guinea
Guinea Bissau
Kenya
Lesotho
Liberia
Madagascar
Malawi
Mali
Mauritania
Mauritius
Mozambique
Namibia
Niger
Nigeria
Reunion
Rwanda
Sao Tome and Principe
Senegal
Seychelles
Sierra Leone
Somalia
South Africa
Sudan
Swaziland
Tanzania
Togo
Uganda
Zaire
Zambia
Zimbabwe

DECLARATION

The thesis is my original work and has not been presented for a degree in any other university. All sources of material used have been duly acknowledged.

Joyce Bukirwa Nyumba

May 1998

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

Dr. Lishan Adam

May 1998.