

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

CD-ROM DATABASES AS INFORMATION SOURCES FOR AFRICAN
RESEARCHERS: A CASE STUDY OF THE CD-ROM SERVICE AT
ADDIS ABABA UNIVERSITY LIBRARY SYSTEM

A Thesis

submitted in partial fulfilment of the requirements
for the degree of Master of Science in Information Science

by

NAOMY MTANGA

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ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATE STUDIES
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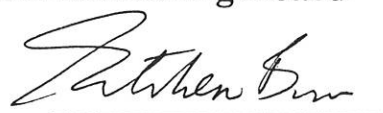
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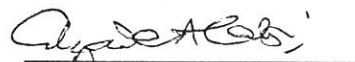
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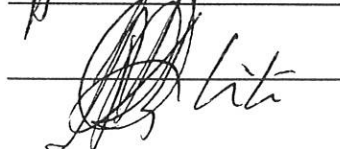
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DEDICATION

**To Louise M. Chanda, Harry Mtanga, Patrick Ngulube Samson and Ruth Gon'ga,
Mary Lando and in Memory of my mother, Leontina Delfine Chinkumbi who highly
valued education**

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Naomy Mtanga

SISA

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ABSTRACT

This thesis is a result of the study that was undertaken to assess the effectiveness of CD-ROM databases in meeting the research and teaching needs of African researchers, taking Addis Ababa University Libraries as a case study. The study was carried out by means of a survey in order to get a user appraisal on how their needs for current information were being met through the **CD-ROM** search facilities available in the University Libraries.

The survey results showed that the service was being underutilized, the major contributing factor being, the lack of awareness about the existence of the service. The methods that the Libraries had employed in publicizing **CD-ROM** were proved to have been ineffective and users suggested how the Libraries could improve the publicity of the service.

Although the number of staff and students who had actually used **CD-ROM** facilities was very small in proportion to the entire user population, their satisfaction rate was very low and they pointed out certain weaknesses of the service and recommended measures to be taken in order to redress the situation.

The respondents who had not used **CD-ROM** service in the Addis Ababa University Library System expressed a desire to utilize available databases. The majority of the respondents were in favour of sustaining **CD-ROM** even at the expense of journal subscription and they also overwhelmingly welcomed the idea to have them pay for the delivery of full text articles provided this would quench their hunger for current information.

African university libraries have been urged to carry out periodic evaluations of the **CD-ROM** service in order to determine the extent to which it contributes to the fulfilment of

the research and teaching needs of the institutions.

On the basis of the analysis of the survey results recommendations have been made to the end of ensuring effective and appropriate utilization of **CD-ROM** databases. The recommendations include a systematic and consistent User Education Programme, including orientation of users on the **CD-ROM** Service and demonstrations; training of manpower on how to conduct literature searches on **CD-ROM**; locating the workstations where they are visible and approachable by users rather than putting them in the basement or offices; and the enactment of a policy on information to govern the utilization of available information resources and services, including the effective and appropriate use of **CD-ROM** databases. In order to save time for the users, it has been recommended that databases be created on the articles received through document delivery and that these first be checked before conducting the search on the **CD-ROM** databases.

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LIST OF ABBREVIATIONS

AAAS	American Association for the Advancement of Science
AAU	Addis Ababa University
AAUL	Addis Ababa University Libraries
AAULS	Addis Ababa University Libraries System
ABNCD	Abebe, Bamuhiiga, Neelameghan, Chisenga and Carolyn, Dorothy
ACP	African Caribbean and Pacific countries
AFNOR	Association Francaise de Normalisation
AIM	Abridged Index Medicus
ARPA	Advanced Research Project Agency of the United States Department of Defence
ASLIB	Association of Special Libraries
BBIP	British Books In Print
BIEF	International Bank of Information on French Speaking Countries
BIP	Books In Print
BLAISE	British Library Automated Information Service
BNB	British National Bibliography
BRS	Bibliographic Retrieval Services
CAB International	Commonwealth Agricultural Bureau International
CABI	CAB International

CAFS	Centre for African Family Studies
CCF	Common Communication Format
CD	Compact Disc
CDA	Compact Disc Audio
CD-DA	Compact Disc-Digital Audio
CD-I	Compact Disc Interactive
CDMARC	Compact Disc Machine Readable Catalogue
CD-PROM	Compact Disc Programmable
CD-ROM	Compact Disc Read-Only-Memory
CD-ROM XA	CD-ROM Extended Architecture
CGIAR	Consultative Group on International Agricultural Research
CIMMYT	International Maize and Wheat Improvement Centre
CTA	Technical Centre for Agricultural and Rural Cooperation
DAI	Digital Audio Interactive
DIN	Deutsches Institut für Normung
DOS	Disk Operating System
ECHO	European Commission Host Organization
ERIC	Educational Resources Information Centre
ERL	Electronic Reference Library
ESA	European Space Agency
ESA-IRS	European Space Agency Information Retrieval System

EURONET	European Online Network and Retrieval Service
FAME	Financial Analysis Made Easy
FBE	Faculty of Business and Economics
FNP	Food and Nutrition Project
FRPC	Faculty Research and Publications Committee
FSTA	Food Science and Technical Abstracts
IAR	Institute for Agricultural Research of Ethiopia
IBM	International Business Machines
ICS	International Community School of Addis Ababa
ICT	Information Communication Technology
IDR	Institute of Development Research
IDRC	International Development Research Centre
IER	Institute of Educational Research
IES	Institute of Ethiopian Studies
ILCA	International Livestock Centre for Africa
ILRI	International Livestock Research Institute
ISO	International Standards Organization
JANET	Joint Academic Network
KIT	Royal Tropical Institute of the Netherlands
LA	Library Association of the United Kingdom
LISA	Library and Information Science Abstracts
MAC	Multiple Access Computers
MARC	Machine Readable Cataloguing

MDC	Mead Data Central
MEDLARS	Medical Literature Analysis Retrieval System
MEDLINE	Medical Literature Analysis and Retrieval System Online
MIBIS	Microcomputer-Based Bibliographic Information Systems
MIT	Massachusetts Institute of Technology
NAARS	National Automated Accounting Research System
NAL	National Agricultural Library of the United States
NASA	United States National Aeronautics and Space Administration
NLM	United States National Library of Medicine
NSTIDC	National Scientific and Technological Information and Documentation Centre
NTIS	National Technical Information Service
OCLC	Online Computer Library Centre
ODA	Overseas Development Agency
OFS	Orange Free State
OIA	Office of International Affairs of the National Research Council of the United States
OPAC	Online Public Access Catalogue
ORBIT	Online Retrieval Bibliographic Information Time-Shared

OUP	Oxford University Press
PADIS	Pan African Development Information Systems
PAHO	Pan American Health Organization
PFDS	Pergamon Financial Data Services
RAM	Random Access Memory
RECON	Remote Console
SALSTINET	Sierra Leone Science and Technology Information Network
SAREC	Swedish Agency for Research Cooperation with Developing Countries
SCSI	Small Computer Systems Interface
SDC	System Development Corporation
SDI	Selective Dissemination of Information
SISA	School of Information Studies for Africa
SPIRS	SilverPlatter's Information Retrieval Software
SPSS	Statistical Package for Social Science
SRPC	Senate Research and Publications Committee
STAIRS	Storage And Information Retrieval System
SVGA	Super Video Graphic Adapter
TIP	Technical Information Project
TWX	TypeWriter Exchange Network
UCT	University of Cape Town
UK	United Kingdom
UKOLUG	United Kingdom Online User Group
UMI	University Microfilms International

UNESCO	United Nations Education and Scientific Organization
USAID	United States Agency for International Development
VGA	Video Graphic Adapter
WHO	World Health Organisation
WITs	Witwatersrand
WORM	Write-once-read-many
ZRC	Research Council of Zimbabwe

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CHAPTER 1

INTRODUCTION

1.1. BACKGROUND TO THE STUDY

Throughout the world, information and communication technologies are generating a new revolution already as significant and far-reaching as those of the past. It is a revolution based on information, itself the expression of human knowledge. Technological progress now enables us to process, store, retrieve and communicate information in whatever form it may take, unconstrained by distance, time and volume(Bangemann in Talero and Gaudette 1995, 146-147).

According to Keylard(1993, 11-12), it has been estimated that the amount of scientific literature doubles about every 17 years. As a result of the information explosion, the developed world has been saturated with huge amounts of readily available information. The growth of scientific literature and data has also triggered the need for effective tools to gain access to the right information at the right time and in the right place. Computers have made it possible for information seekers to find the needle of information in a gigantic haystack of sources. Computerized secondary sources, i.e. bibliographic databases, are now readily accessible from virtually any place in the industrialized world by linking computers via a telecommunications network to a host computer on which several databases are mounted(an online connection).

Information technology is envisaged as an effective means of transferring information from the information-rich west to the information-starved developing countries(Ali in El-Hadidy 1994). Both online and **CD-ROM** database systems have become essential tools for

research and information gathering in many of today's libraries(Lee et al 1993).

Information seekers in developing countries, however have difficulty in accessing remote online databases because of inadequate telecommunication infrastructure. A paper presented at the **Ninth session of the Conference of African Planners, Statisticians, and Population and Information Specialists(UNECA 1996)** stated that the use of online access in developing countries is subject to the availability of resources. The high telecommunication tariffs and unreliable telecommunication infrastructure makes online access to commercial databases relatively impractical.

CD-ROM has widely been advocated as the appropriate technology for African countries and the rest of the third world. Ali in El-Hadidy(1994), asserts that there is consensus among information professionals that the characteristics of **CD-ROM** technology make it the appropriate technology for those areas of the developing world where the information infrastructure is inadequate to support cost-effective online access.

That **CD-ROM** is an information technology with great potential for African scientists and scholars is not in question(AAAS 1993,1). With this conviction, American Association for the Advancement of Science(AAAS), undertook a number of activities in order to create a favourable environment for **CD-ROM** use in Africa. In 1990 for example, a survey was conducted on *Computer and CD-ROM capability in African university and research institute libraries*. Specialized seminars for decision makers were also organized.

In January 1994 AAAS Sub-Saharan Africa Program launched a three-year Pilot Project in seven African universities, with the objectives of evaluating how well **CD-ROM** can complement journal subscriptions and assessing the costs involved, including human resource costs. The universities participating in the project were Addis Ababa University, University of Dar es salaam, University of Ghana, University of Ibadan, University of Malawi, University of Zambia and University of Zimbabwe. The universities involved with the project were provided with bibliographic databases in the sciences and social sciences and document delivery assistance(Levey,Ngwira and Patrikios 1996, 6,153-54).

Appreciating the difficulties confronting African universities when choosing databases to suit their needs, in the absence of appropriate tools to use in making decisions, AAAS Sub-Saharan Africa Program embarked on an initiative to evaluate **CD-ROM** databases in the sciences and social sciences for their relevance to African teaching and research needs. Five of the seven universities participating in the Pilot Project were selected for carrying out the assessments. These were: Addis Ababa University - evaluated databases in the physical sciences; University of Dar es salaam - evaluated databases in Engineering and technology; University of Ghana - evaluated databases in the Social Sciences; University of Malawi, Bunda College of Agriculture - evaluated databases in Agriculture; and University of Zimbabwe - evaluated databases in the health and life sciences(Levey,Ngwira and Patrikios 1996, 6).

The project had two goals. The first was to assess a large number of databases and the second was to devise practical selection criteria to assist African universities and other institutions in reaching purchasing decisions instead of relying on lists of useful databases.

It should be noted that these evaluations were not of a full CD-ROM service like the one undertaken in this study, but rather focused on the contents of the CD-ROM database and software features, as well as cost considerations(Levey,Ngwira and Patrikios 1996,6). . Following the evaluations, a workshop for the universities involved in the Pilot Project was organized and held in October 1995, in Nazareth, Ethiopia.

1.2. STATEMENT OF THE PROBLEM

Increasing costs of journals subscriptions are forcing libraries every where to cut down on the number of titles they subscribe to and deciding on which ones to discontinue and which to maintain can be a daunting task. AAUL has found that with limited budgets, carefully selected **CD-ROM** databases coupled with document delivery have provided a basis for deciding on which journals are so essential that the libraries must own and which ones can be covered by document delivery(Addis Ababa University Libraries 1996).

From the database evaluations done in the physical sciences it was concluded that most of the databases were appropriate for purchase by universities with postgraduate studies and research programmes(Abebe Rorissa, Adhana Mengsteab and Wendimagagn Mammo 1996), but there was need to broaden the user base to warrant subscription to the databases. The 1995 *CD-ROM Pilot Project Report*(Addis Ababa University Libraries 1995) noted that only less than a quarter of the users repeatedly placed requests. The *CD-ROM Pilot Project Progress Report for 1996*(Addis Ababa University Libraries 1996) indicated a similar situation(See table 1.1.).

Out of a total of 1306 faculty staff (549) and graduate students (757), the main focus of the **CD-ROM** service at present, only 178 (i.e. 129 graduate students and 49 faculty staff)

used **CD-ROM** service between July and December 1996(Addis Ababa University Libraries 1996). This is barely 13.6 per cent of the total target population of users on average.

The Progress Report also observed that although the total population of users in the School of Information Studies for Africa (SISA), was less than in most other faculties, they were among the heavy users of the service. This heavy usage has been attributed to their awareness and knowledge of the importance of information in general and **CD-ROM** service in particular.

Table 1.1. Showing the Number of people using **CD-ROM** (from July-December 1996)

FACULTY/COLLEGE	NUMBER OF PEOPLE USING CD-ROM			TOTAL POPULATION /POTENTIAL USERS	
	Graduate Students	Staff	TOTAL	Graduate Students	Staff
SISA	15	7	22	26	14
ILS	6	2	8	72	56
SCIENCE	15	10	25	145	132
CSS	3	2	5	69	57
TECHNOLOGY	1	-	1	14	77
IDR	1	-	1	23	12
EDUCATION	18	5	23	73	58
FBE	15	3	18	40	45
MEDICAL	55	20	75	295	98
Totals	129	49	178	757	549

Source: **CD-ROM** Pilot Project Year-End Progress Report for 1996, Addis Ababa University Libraries.

Perhaps these were among the users who had been observed to be addicted to the service and whose comments affirmed satisfaction with the service as indicated by the report. This however, does not give a comprehensive picture of the usefulness of the service at AAU. Neither does it explain why the majority of the potential users are not making use of the service.

From the time **CD-ROM** service was introduced to Addis Ababa University, no users' study has been carried out (Addis Ababa University Libraries 1996) other than the database evaluations initiated by AAAS. Therefore, there was need to study the users in order to determine their level of satisfaction with the service and to investigate the reasons for the low usage.

1.3. JUSTIFICATION FOR THE STUDY

The primary function of a university library is to provide facilities for study and research for its clientele - the undergraduates, the graduates, post graduates, researchers and the academic community in general. In addition, it has a duty, though secondary, to its local community, to members of other local institutions of higher learning, government organisations, non-profit making bodies, professionals and so on (Elemide and Havard-Williams, 1986).

Among the objectives of Addis Ababa University (AAU) as outlined in the Council of Ministers Regulations (Addis Ababa University 1993), are the following:

1. To search for, cultivate, preserve, and transmit knowledge;
2. To conduct research and studies, in an objective and dispassionate way and free

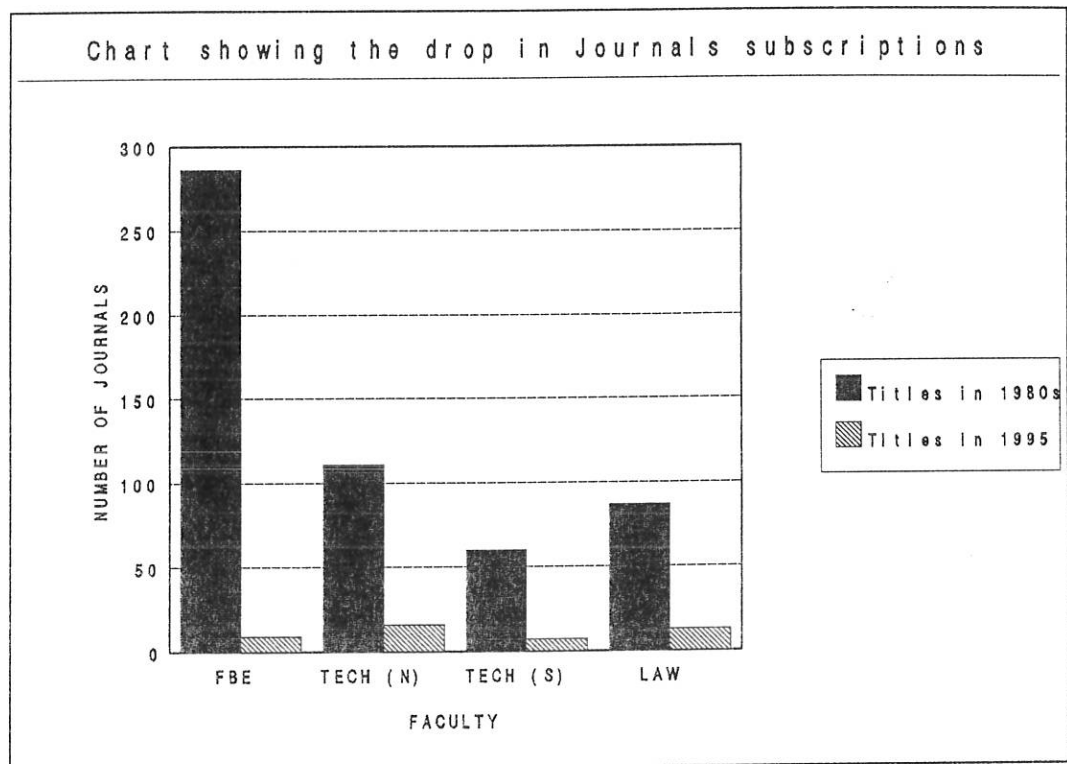
from any bias, on different fields and disseminate fruitful results there of.

In an academic world, lack of access to scientific literature generally results in duplication of research efforts(Keylard 1993,11). The pace and complexity of modern research have greatly increased the information and communication needs of researchers, scientists, engineers and their institutions. Research and development relies heavily on the ability to gather reliable data; have access to widely dispersed data and information;collaborate on projects;hold discussions and conferences; and disseminate the results(United States National Research Council 1996, 3). In order to meet the instructional and research needs of the university, provision of timely information is vital.

A study conducted by a university appointed committee for the study of Addis Ababa University Libraries(AAUL) highlighted twenty indicators of the crisis facing the university libraries system. To cite a few, the report stated that 95% of undergraduate students studied said that the books they needed were not available; 93% of postgraduate students said that the number of copies of books were inadequate; 93% of the staff said the journals they needed were not available; less than 3% of the books in the libraries were published after 1990, indicating that the stocks were outdated(Addis Ababa University 1996).

The faculties adversely affected by a lack of up to date books were Law, Faculty of Business and Economics(FBE), Technology North and Technology South. The above-mentioned report also stated that the number of journals had been decreasing considerably from 1980 to 1995 and the years 1989 to 1995 constituted the major gap as shown in Figure 1.1. The Science Library had periodicals subscriptions suspended in 1989(Addis

Figure 1.1. Showing the decline in the Number of Journals



It should be pointed out though, that the above-mentioned study may have had some flaws and limitations in terms of the method used in selecting the sample for the distribution of the questionnaire. In spite of its limitations, the study is useful as an indicator of the problems facing the Addis Ababa University Libraries, which evidently, have not been able to effectively facilitate research and study through the provision of timely information.

With the advent of **CD-ROM** which is often considered as the major electronic information search tool in the library environment for the 21st century (Lee et al 1993), the gap in information sources experienced by Addis Ababa University Libraries can be effectively bridged through provision of access to unlimited numbers of journal back issues as well as the journals that the libraries are unable to subscribe to. In this regard

Lancaster, (1989) asserted that many sources of information can be made available to users that could not be available if the library were required to purchase and store the source.

Addis Ababa University Libraries(AAUL) no doubt, intend to fully exploit this electronic search tool. The University Libraries publish a newsletter entitled: *CD-ROM @ Addis Ababa University Libraries* to promote the **CD-ROM** service. Demonstrations of **CD-ROM** databases have also been carried out in two faculties. However, **AAAS CD-ROM** Pilot Project year two reports(Levey,Ngwira and Patrikios 1996) indicated that **CD-ROM** user statistics were low in all the universities involved in the Pilot Project, including AAU.

While *Year Two CD-ROM Pilot Project Report*(Addis Ababa University Libraries 1995) advocated a broader user base, the *1996 Progress Report* (Addis Ababa University Libraries 1996) stated that the **CD-ROM** service was gaining recognition among the university community, the volume of use had also increased more than ever. The report (Addis Ababa University Libraries 1996) also stated that during the Pilot Project period usage trends and user satisfaction had been increasing and many users were saying that without the service they could not have completed their research work.

However, figures provided in the same report showed an increase only in the number of search requests, the size of records downloaded or printed and the number of documents requested or delivered, but there were no figures to show corresponding increase in the number of users.

Evaluation is a key concept, underlying the development and improvement of information services, the justification of these systems, the appreciation by both operators and users

of the potential and limitations of their systems and services, and their development of an increasing ability, again for both operators and users, to get the best out of their system(Bawden 1990, 4-5). It can thus be noted, that evaluating information services is one way of establishing whether or not they meet a genuine need adequately. It also serves to highlight any shortfalls with a view to improving the services.

In view of the high costs involved in acquiring equipment and maintaining **CD-ROM** search service, periodic evaluation of the service is necessary in order to establish whether the usage made of it justify the amount of spending. With the AAAS **CD-ROM** Pilot Project having come to an end in December 1996, what is the fate of **CD-ROM** service at AAU? Will the service die a natural death as is often the case with many donor initiated projects in Africa? According to the Pilot Project End of Year Progress Report(Addis Ababa University Libraries 1996), the university administration is working hand in hand with the library administration to improve and sustain the **CD-ROM** service.

As a result of the above, the university administration has approved and allocated a budget for **CD-ROM** database subscriptions and document delivery with effect from this fiscal year. The library administration has also utilized funds from the Swedish *Agency for Research Cooperation with Developing Countries (SAREC)* for the same purpose.

These are very encouraging developments in ensuring continuity of the service. But for how long will this support go on, considering budget cuts and inadequate funding so characteristic of institutions in Africa? Therefore the issue of long-term sustainability of the service arises. Can users be persuaded to contribute to sustaining and maintaining the service? This all depends on how much value they attach to the service. These are the

issues this study tries to look into.

In the light of all that has been said about **CD-ROM** technology and the fact that **CD-ROM** technology was introduced to Addis Ababa University library way back in 1989, this study will reveal what effect, the service has had on the overall research and scholarly activities in the university. It will also complement the evaluations on **CD-ROM** data bases done by AAAS and provide a comprehensive picture of the effectiveness of **CD-ROM** service provided by Addis Ababa University Libraries.

1.4. OBJECTIVES

1.4.1. General Objective

The objective of this research is to assess the effectiveness of **CD-ROM** search service in meeting the research and teaching needs of African researchers, with specific reference to Addis Ababa University.

1.4.2. Specific Objectives

1. To determine the extent to which the service is actually utilized by the various segments of the user community;
2. To establish the level of user satisfaction with the service.
3. To identify factors that influence the use/nonuse of the service;
4. To identify what measures have been made to promote and improve the service over the years;
5. To highlight problems being faced by the library in dispensing the service;
6. To recommend measures to be taken in order to ensure effectiveness of the service.

1.5. SCOPE AND LIMITATION OF THE STUDY

Addis Ababa University has various campuses within and outside the city. In view of the time and financial resources available to conduct the study, it was not possible to cover all the faculties making up Addis Ababa University. Only the campuses within the city of Addis Ababa were covered by the study; namely, the *main campus*, *FBE campus*, *Technology North*, *Technology South*, *Science and Medical faculties*.

1.6. SIGNIFICANCE OF THE STUDY

The results of this survey could provide input for the formulation of the University's policy on information service and particularly on **CD-ROM** service and its sustainability. Although positive action has been taken by the university administration in support of **CD-ROM**, a long term commitment to sustain the service is required. The results of this study may be used to convince university authorities of the importance of the service to the institution and the need to rank it high among institutional priorities.

The library may need to embark on more promotional activities in order to broaden the user base. The resultant improved and expanded services will benefit more users and enrich their research through access to timely information in their area of interest. The lessons drawn from the experience of Addis Ababa University can be applied to other African universities.

1.7. METHODOLOGY

Primary data were collected by means of a survey which was carried out using questionnaire and interviews. Secondary data were collected by means of document study.

1.7.1. Population

CD-ROM service offered at Addis Ababa University is intended for users who require current scholarly information such as academics and researchers, not an average library user. At Addis Ababa university **CD-ROM** service is focused on graduate students and faculty staff.

These two groups are the obvious target population. However, since undergraduate students also conduct some research, it was felt reasonable to include them in the study. Nevertheless, only third year students and above were included, as there was little point in surveying freshmen and sophomores. This is so because first year students are not even registered users of the university library, but have freshman reading rooms where they borrow books for on-the-spot reading.

In second year they are just being introduced to library services and their courses mainly focus on reading prescribed text books from the reserved section. Third year students, however are senior enough to be introduced to **CD-ROM** service in preparation for the research they will undertake in their fourth year, although some of the courses require them to write term papers or do research during third year.

1.7.2. Sampling

Since it was not possible to survey the target population in its entirety due to its size and available resources, sampling was done. A sampling frame of 4555 was therefore, prepared from the list of registered students from the Registrar's department and a list of faculty staff obtained from the Academic Programmes Office .

1.7.2.1. Sample Size

To come up with the sample size, the approach used was based on the precision rate and confidence level and the method of determining sample size when estimating a percentage or proportion (Kothari [1985] 1990, 217). Precision was specified at 0.05 with 95% confidence level. According to Kothari ([1985] 1990, 217-218), since the confidence interval for universe proportion, p is given by

$$p \pm z \cdot \sqrt{\frac{p \cdot q}{n}} \dots\dots\dots (i)$$

where

p = sample proportion, $q = 1-p$;

z = the value of the standard variate at a given confidence level;

n = size of sample;

Then with the given precision rate, the acceptable error, 'e', can be expressed as:

$$e = z \cdot \sqrt{\frac{pq}{n}} \dots\dots\dots (ii)$$

or

$$e^2 = z^2 \frac{pq}{n} \dots\dots\dots (iii)$$

or

$$n = \frac{z^2 \cdot p \cdot q}{e^2} \dots\dots\dots (iv)$$

The formula gives the size of the sample in case of infinite population when we are to estimate the proportion in the universe (Kothari [1985] 1990, 218). But in case of finite population, the above stated formula will be changed to:

$$n = \frac{z^2 \cdot p \cdot q \cdot N}{e^2(N-1) + z^2 \cdot p \cdot q} \dots\dots\dots(v)$$

Using this formula, and taking e to be 0.05 and the value of p as 0.136, and 4555 as the value of N , a sample size of 174 was obtained.

1.7.2.2. Sampling technique

Simple random sampling was used in selecting the sample. This was done to give equal opportunity of being selected to each member of the target population. To that end, the sampling frame was numbered from 1 - 4555. A table of random numbers was then used to pick numbers at random and the names bearing those numbers were picked to constitute the survey sample. Appendix I shows the table of random numbers which was used in selecting the sample.

1.7.3. Questionnaire

The best way to study service and system effectiveness is to observe the actual process and evaluate the product with both the end user and intermediary. However, the time and cost factors may limit the use of this method. Given the time in which this study was to be conducted, it was not possible to use the observation method. Instead, the questionnaire was employed in spite of its limitations. One reason for this choice was due to its ability to reach a large user population such as the one being studied in this survey and its ability

to yield results in a comparatively shorter period of time.

In this study, the sample size was increased by printing twenty extra questionnaires in order to increase the number of responses. Hence a total of 194 copies of the questionnaire were distributed to a number of **CD-ROM** users, and potential users comprising 169 students and 25 faculty members to find out their views concerning the **CD-ROM** service. The questionnaire had both closed ended and open ended questions. A sample of the questionnaire has been appended to the thesis in Appendix II.

1.7.4. Interviews

Interviews were conducted with the University Chief Librarian, the librarian for the *Medical Library*, and the persons in charge of the **CD-ROM** sites at Kennedy Library and Medical Library. Interview guides were prepared and distributed in advance. These were aimed at finding out how the librarians felt the service was faring and to discover any problems they were facing and how these ought to be solved. Appendices III and IV show samples of the Interview guides used.

1.7.5. Document Study

Document study involved reviewing user statistical reports maintained by the **CD-ROM** centres (i.e. Kennedy Library and Medical Library) and various reports on the AAAS **CD-ROM** Pilot Project and related publications.

1.7.6. Data Analysis

The Statistical Package for Social Sciences (**SPSS**) was used to analyze the survey results and WordPerfect (version 5.1) software package was used to compile the report.

1.8. ORGANISATION OF THE THESIS

The thesis is comprised of six chapters. The first chapter provides an introduction to the thesis. It gives background information and justification for the study. The general objective, specific objectives, the scope and limitations of the study as well as the methodology used to collect and analyze the collected data are given in this chapter.

The second chapter is a review of the literature on **CD-ROM** technology. It traces the history of the technology taking note of developments and advances made to date and also discusses the future prospects of the technology. Chapter three briefly discusses the application of **CD-ROM** technology in Africa with particular reference to Ethiopia. It highlights the significance of **CD-ROM** technology to Africa, the areas of application and traces the history of **CD-ROM** technology application in Ethiopia down to current trends and also discusses the future prospects of the technology in the country.

The fourth chapter gives a description of the Addis Ababa University Library System. It states the objectives, the organization structure, including the branch libraries. The introduction of computers and **CD-ROM** databases to the university, the phases that **CD-ROM** service at the institution has undergone are also discussed here. The chapter concludes with a review of computerization plans and implications of Internet connectivity.

The presentation and analysis of the research results as well as the interpretation are contained in chapter five. Chapter six presents the conclusion and recommendations of the study.

The list of Bibliographic materials consulted in the course of the thesis work follows the last chapter. This is followed by the appendices showing the table of random numbers used for sampling purpose, the sample questionnaire and interview guides that were used to collect data, and the list of persons who were interviewed and those with whom informal discussions were held.

1.9. SUMMARY

This chapter has highlighted how modern day society is being revolutionized by information. The role of technology as a means of processing, storing , retrieving and transferring information without the constraints of distance, time and volume has also been pointed out. Developing countries, however have difficulties in accessing timely information from remote online databases due to poor telecommunications infrastructure. For this reason CD-ROM, which does not require telecommunications has been advocated for developing countries.

The problems being faced by Addis Ababa University Library System in providing timely information for teaching and research, have been highlighted in this chapter. Although CD-ROM facilities exist in the Libraries, indications are that they are not being effectively utilized. This study therefore, was aimed at investigating the problem as stated in the objectives.

This chapter also outlines the methods used in conducting the study, analysing the data and the significance of the study. The chapter finally presents the manner in which this thesis is organized.

CHAPTER TWO

CD-ROM TECHNOLOGY AN OVERVIEW

2.0. INTRODUCTION

The confluence of computers and related technologies has opened a new chapter in the information revolution. Changes in technology, society and our economy have changed the role and value of information, which is now viewed as a commodity to be bought, sold and owned(Herther 1988).

In the 1960s developments in computer technology were driven by principles of electronics, i.e. the use of electricity for encoding, storing and transmitting information. These developments were characterized by the mushrooming of online information retrieval systems. Convey (1994, 3), defines online information retrieval as the use of a computer in searching for and the retrieving of selected information from the data held on a computer. The data is normally held in form of databases. A database is a collection of related items of information held in machine readable form. As will be seen in this chapter, online searching initially involved searching and retrieving retrospective bibliographic data stored on computer databases of organizations for in-house consumption. The databases where created on magnetic tapes.

Since the 1980s another force has been directing technological developments - **optics**. Publishers have been drawn directly into the process of developing new products in optical formats(Herther 1988), among which **CD-ROM** features prominently. This chapter presents an over view of **CD-ROM** technology. However, since **CD-ROM** can be considered as a form of online information retrieval(Hartley et al 1990, 1)), the chapter

starts by discussing online retrieval, tracing it back to the 1960s. The development of commercialized online retrieval systems in the 1970s is discussed up to the developments of the 1980s and the status quo in the 1990s. **CD-ROM** and remote access of databases are now considered as online searching since they both involve interrogating the computer in order to retrieve information stored therein, whether on a remotely located database or a database that was created elsewhere and can now be read from a local computer.

CD-ROM is introduced from its origin including its faltering start through the evolution of the industry in terms of coverage, publishers, interface and hardware. Acceptance of the medium in the library market, requirements for **CD-ROM** search service, its suitability for developing countries and future prospects of the technology wind up the chapter.

2.1. ONLINE INFORMATION RETRIEVAL SYSTEMS

2.1.1. Historical Development

The first investigation of online bibliographic searching was made by Bagley in 1951, at the *Massachusetts Institute of Technology (MIT)*. He explored the possibility of programming the

MIT Whirlwind Computer to search encoded abstracts. (Bourne 1980). The techniques of storing and retrieving bibliographic data on computer systems were developed during the 1960s. (Bourne 1980, Hartley et al. 1990, 32).

The first public demonstration of Online bibliographic searching, and major retrospective search service to become available to the general public, was by the United States *National Library of Medicine (NLM)* in 1960 (Bourne 1980, Hartley et al. 1990, 32). In the same year, *System Development Corporation (SDC)* publicly demonstrated an interactive system

known as **Protosynthes**, which searched the entries of an encyclopedia and used many of the techniques now available for current Online searches.

In 1964 the *NLM* started to produce its **Index Medicus**, an index to the world's biomedical literature, by computer (Bourne 1980, Hartley et al. 1990, 32). This linked magnetic tape service was known as **MEDLARS** (*Medical Literature Analysis and Retrieval System*). In the same year, *Lockheed Missiles Corporation* demonstrated an Online system, known as **CONVERSE**, to search its in-house library database. In 1965 Lockheed developed **RECON** (*Remote Console*) for the U.S. *National Aeronautics and Space Administration* (*NASA*), based on Lockheed's own software which had been renamed **Dialog** (Hartley et al. 1990, 33, Gerrie 1988).

In 1965, SDC also developed **ORBIT** (*Online Retrieval Bibliographic Information Time-Shared*), a software resulting from a project funded by the *Advanced Research Project Agency* (*ARPA*), of the *United States Department of Defense* (Bourne 1980, Gerrie 1988, Hartley et al. 1990, 33).

Several other organizations in the U.S. also began to be involved in this area. The *Technical Information Project* (*TIP*) at *MIT* for example, made use of the *Project MAC* (*Multiple-Access Computers*), to search 35 000 citations to the physics literature. This system formed the basis of several subsequent Online systems. IBM developed the *Storage and Information Retrieval System* (**STAIRS**) in 1966 (Hartley et al. 1990, 33).

By 1969, various database producers were creating magnetic tapes containing bibliographic records (Hartley et al. 1990, 32). Many of these magnetic tapes were acquired by large

organizations and used to run in-house information retrieval services such as, the production of indexes, a selective dissemination of information (SDI) service and retrospective searching. (Bourne 1980, Hartley et al. 1990, 32).

Meanwhile, some of the experimental online systems were being translated into working systems. The *Space Documentation Centre of the European Space Agency (ESA)* acquired *RECON* from its American counterpart and began to offer an online information service covering several databases to 10 terminals in seven European countries(Hartley et al. 1990, 33).

2.1.2. Onset of Commercialised Online Information Retrieval

2.1.2.1. Pioneers in the Industry

Commercialised online information retrieval started in 1970 with *NLM* introducing on an experimental basis, an *Abridged Index Medicus Online (AIM/TWX)*, an index to 100 journals in clinical medicine(McCarn 1980, Hartley et al. 1990,33-34, Convey [1977] 1992, 18). *AIM/TWX* was available through the *TypeWriter Exchange Network* and operated from a computer based at *SDC*.

The service was superseded by *NLM MEDLINE (Medical Literature Analysis and Retrieval System Online)* operated from a computer based at *NLM* using the *ELHILL (named after the Lister Hill National Centre for Biomedical Communications)* software, a modification of *SDC's ORBIT*(McCarn 1980, Hartley et al. 1990,33-34).

The *Lockheed Dialog* system began as a commercial search service in 1972 with databases from the *U. S. Office of Education (ERIC)*, the *U. S. National Technical Information*

Service (NTIS) and the *National Agricultural Library (AGRICOLA)*(Hartley et al 1990,34; Convey [1977] 1992, 17). *Mead Corporation* commercially launched the *LEXIS* database (a legal database containing full texts of statutes and law reports: Convey [1977] 1992, 13) in 1974 and in 1983 it launched *NEXIS* (a full text business and news oriented database: Hartley 1990, 50). The *Bibliographic Retrieval Service (BRS)* began operating in 1977 with ten databases(Convey [1977] 1992, 19).

The Dow Jones News/Retrieval Service and BLAISE (British Library Automated Information Service) were introduced in 1977, the latter being based on the ELHILL software. Infoline was introduced in the late 1970s and later became PFDS (Pergamon Financial Data Services) Online. These are a few examples of the pioneers of the online information retrieval industry.

2.1.2.2. Composition of the Online Information Retrieval Industry

The online information retrieval industry comprises the following five main sectors :

(1) Database producers;

The producers of bibliographic databases are typically the learned societies and institutions and the various national government departments active in science-based and other industries, which need to provide information service for their staff and customers(Convey 1992, 15).

(2) Online service hosts;

These are organizations with sufficient hardware capacity, who have also developed software systems to enable users to search the databases on the hosts' computers. Remote computer terminals are linked to the hosts' computers by standard telephone equipment over national and international communications networks in order to facilitate interaction

between the host and the searcher.

(3) Users of the systems;

These comprise libraries, information services and information brokers, who utilize the services offered by the online hosts to provide information for their users in the various industrial, economic, business, public and academic sectors; and also end users.(Convey [1977] 1992, 27).

(4) Telecommunications system

This sector provides the important networks and gateways between the hosts and online searchers and link users with computer systems throughout the world(Convey [1977] 1992, 29).

(5) Hardware and Software Suppliers

All the above require hardware and software; this is a field in which developments take place at a rapid pace, so there is the constant need to update equipment and develop improved software(Convey [1977] 1992, 33).

2.1.2.3. Developments in the Online Information Retrieval Industry

Advances in telecommunications led to establishment of networks such as *Tymnet* and *Telenet* in the United States. Nodes to these networks spread to Europe and subsequently, the rest of the world, thereby facilitating cheap and easy access to remote stores of information. This gave impetus to the worldwide use of online services. The 1980s saw a rapid growth in the number of databases and commercial online services(Hartley et al 1992,34).

BRS Information Technologies, formerly the *Bibliographic Retrieval Service*, covered 150 databases by 1992, mainly bibliographic, with some, full text as well. In 1987 *BRS* established a gateway to *Pergamon Financial Data Services (PFDS online)*. There is also a gateway to *BRS* via the *Online Computer Library Centre (OCLC)*. *BRS* introduced *BRS After Dark*, the first out-of-hours service, which is menu-driven and aimed at the home-user and also *BRS Colleague*, a menu-driven service for medical practitioners, engineers etc.(Convey [1977] 1992, 19; Hartley et al 1990, 44).

By 1992 *Mead Data Central (MDC)*, a part of *Mead Corporation*, was offering over 200 legal and 160 non-legal sources. It had also diversified with other full-text databases, including *Lexpat* and *NAARS (National Automated Accounting Research System)*, and included abstracting services such as *Abi/Inform* and the *New York Times Information Bank*. With the European Headquarters in the UK providing marketing, training and customer support for its *LEXIS* and *NEXIS* users, *MDC* had become the world's largest single online database host by 1992(Convey 1992, 19; Hartley 1990, 50).

H. W. Wilson Company introduced its *Wilsonline* service in 1984, offering its own databases such as *Applied Science and Technology Index*, *Biography Index*, etc., and became a significant competitor to *DIALOG* and *BRS*. Other database producers and service providers included in the online industry were *DataStar*, launched in 1980; the *European Space Agency's Information Retrieval Service (ESA-IRS)*, *ECHO (European Commission Host Organisation)* service, launched in 1980; *European Online network and Retrieval Service (EURONET/DIANE)*, also launched in 1980; *Data Courier Inc.*; *Predicasts Inc.* *Reed International plc.*; *Dun and Bradstreet*; *Information Access Company* and *University Microfilms International (UMI)/Data Courier*.

2.2. THE ADVENT OF THE CD-ROM

2.2.1. The origin of CD-ROM

CD-ROM belongs to a family of very high density *optical discs* such as **Compact Disc Audio (CDA)** or **Compact Disc-Digital Audio (CD-DA)**, **Compact Disc Interactive (CD-I)**, **Write-once-read-many (WORM)**, **Compact Disc Programmable read only memory (CDPROM)**, **DataRom** and **erasable**(Compton 1993,7; Cox 1994, 5; Hartley 1990, 3). *Optical disc technology* grew out of the *video* industry(Stunt 1993, 25). This type of technology was a sequence of the development of *videodisc systems*, but although technically viable, these early *videodiscs* were overtaken by the *video cassettes* as the standard product. Following this early technology, **audio compact discs** appeared in the early 1980s.

Consumer acceptance was phenomenal as the volume of sales grew by more than 200 per cent each year starting from 1983(Herther 1987). This overwhelming success of the **audio CD** caused many manufacturers of discs and the player/drive systems to invest in the development of **CD-ROM**. Thus the concept of storing digital data on *optical discs* became economically feasible(Stunt 1993, 25).

2.2.2. The CD-ROM's Faltering Start

There was quite a lot of 'hype' surrounding this new medium in the 1980s(Tedd 1995). The mass storage capabilities of **CD-ROM** accounted most clearly for its initial appeal to the library market. Library staff who for more than a decade had been using telecommunications networks to access large quantities of bibliographic data stored in remote online databases were enthusiastic about the **CD-ROM**(Cox 1994,6).

Libraries could now, with fixed annual charges, search databases without requiring telecommunication services. This was significant in the case of online databases which indexed the literature of individual subject areas such as business, medicine and technology. Although offering powerful retrieval facilities and containing much information of value to library users, these databases were only used selectively since charges were levied for every use according to a combination of the length of time for which the user was connected to them and the data retrieved from them(Cox 1994,6).

CD-ROM held out the possibility of offering unlimited access at a guaranteed cost and encouraging library users to conduct their own searches through simpler retrieval facilities with liberal use of menus and help screens.

In spite of its appeal, **CD-ROM** was not an instant success(Cox 1994,7). Herther, (1987) also observed that the **CD-ROM** market had not progressed as many had hoped in 1986. A number of reasons accounted for the slow take off of the **CD-ROM** market. Firstly, only a few companies were providing services for mastering and replication of discs and the turnaround times for the processes were too long. Successful online service providers and print publishers also viewed **CD-ROM** as a threat to their products(Cox 1994, 7).

As a result publishers tended to experiment carefully with **CD-ROM**. Libraries were also discouraged by the prohibitive subscription charges and equipment costs involved. In those days microcomputers, **CD-ROM drives** and printers were very expensive. **CD-ROM drives** initially cost nearly £1000(Cox 1994,7). Due to the prevailing pace of innovation in the domain of data storage, it was also felt that **CD-ROM** would soon be rendered obsolete by some new technology.

There was also need for a standard to regulate directory structure and file management facilities when placing data on **CD-ROM discs**(Cox 1994, 7,8). While **CD-ROM** offered mass storage capabilities, its slower access times meant that complex hierarchical directory structures needed to be avoided. However, due to lack of a standard, companies ended up following a range of file management procedures which were not always compatible. Herther(1987) also mentions the confusion resulting from announcements of new products, namely, **CD-I** and **CD-PROM**, at the *Microsoft Conference* of 1986, as another factor that worked to slow down the growth of the **CD-ROM**.

2.3. EVOLUTION OF THE **CD-ROM** INDUSTRY

The 1990s have seen tremendous growth in the production and use of **CD-ROMs**. A major contributing factor has been the establishment of the **High Sierra Standard**, by a group of experts of the emerging **CD-ROM** industry, in 1986(Cox 1994, 9; Hartley 1990, 57; Herther 1987). The standard has been adopted by most publishers and forms a basis of the **International Standard ISO 9660** for recording information on **CD-ROM discs**, which became accepted in 1988. This enabled the use of **CD-ROM discs** from different producers to be read from **CD-ROM drives** produced by other companies(Tedd 1995; Cox 1994, 9; Hartley 1990, 57). **CD-ROM** has undergone many changes since its inception.

2.3.1. Change in **CD-ROM** coverage

Many of the early **CD-ROM** products covered bibliographic information, as database producers of indexes and abstracts, who made their products available for online remote searching started to make use of the new storage medium(Tedd 1995; Hartley et al 1990, 57). **CD-ROM** titles have grown to include a wide range of subject areas including bibliographic support tools, indexing and abstracting services, full-text and reference

titles. **multimedia** and even **hypermedia** products are also making their mark on the market(Cox 1994, 11).

Whole text of original works such as journals, newspapers, books and literary works are now available on disc. For example, starting from 1991, three major *UK* newspapers, *The Independent*, *The Times* and *the Guardian* became available on **CD-ROM**(Tedd 1995; Cox 1994, 12). Textbooks and literary works on **CD-ROM** include the *Oxford Textbook of Medicine*, *the Bible*, *Shakespeare on Disc* and *English Poetry*(Cox 1994, 12; Tedd 1995).

A notable product in full-text databases on **CD-ROM** is the **ADONIS** system which contains full texts and illustrations of 600 biomedical and related journals from fifty publishers(Tedd 1995; Cox 1994, 12). The images of the pages in these journals can be printed as required, thus offering libraries an alternative to subscriptions for hard copy versions of the journals.

CD-ROM is also used in the distribution of information from the book trade. One example is **The BookFind-CD**, which contains detailed information such as full annotations, contents lists and subject access points for two million items which can be used by acquisitions librarians in the selection and processing of materials.

Another is **The TES BookFind-CD**, which contains reviews from twenty educational journals as well as the 'standard' information on 600 000 titles. *Whitakers* introduced the **Bookbank CD-ROM** in 1987 which covers **British Books in Print(BBIP)** and by 1992 had linked up with the *US* publisher *Bowkers*, producers of **Books in Print (BIP)**, to produce a combined **CD-ROM** database of some two million titles(Tedd 1995).

CD-ROM has also been used for publishing library catalogues(Marks 1994, 183-192; Heaney 1994). **MARC** records for use in local catalogue compilation have been distributed on a number of **CD-ROM** products. The British Library and Library of Congress have produced the **BNB(British National Bibliography)** on **CD-ROM** and the **CD MARC** respectively. The German, French and Spanish national bibliographies are also on **CD-ROM** and like the BNB, allow menus and help messages to be displayed in a number of languages(Cox 1994, 10, 11).

In the 1990s the major change in coverage has been the growth of **multimedia CD-ROMs**. **Multimedia systems** have been defined as '*systems which combine audio-visual and data processing into one box which is represented on one medium (usually some form of compact disc or hard disc) which contains at least three of text, audio, computer graphics, still or moving footage (i.e. film or video)*'(Hoffos 1993).

Information covered on these **multimedia CD-ROMs** includes images, feature films, music, birdsong, sports' handbooks, travel guides and medical information. Examples of **multimedia** products are *McGraw-Hill's Encyclopedia of Mammalian biology*, *the Hulton Deutsch's photograph collection*, *the New Grolier Encyclopedia* and *Microsoft's Encarta* which enables voice recordings of famous people to be heard as well as the anthems of various countries, how to count up to ten in various languages and much more(Tedd 1995).

2.3.2. Changes in CD-ROM Publishers

The *Library Association (LA)* of *UK* was among the first organizations to make use of **CD-ROM** with *LISA (Library and Information Science Abstracts)*. Other pioneers in making their databases available on **CD-ROM** discs were the *NLM in the U.S. (Medline)* and the *U.S. Office for Education (ERIC)*(Tedd 1995).

Established online hosts such as *DIALOG*, and *H. W. Wilson* have moved into **CD-ROM** production(Cox 1994, 14). Companies such as *Microinfo*, *Optech* and *Cambridge CD-ROM* act as agents for products from different publishers. Some companies like *Ebsco* and *Faxon*, who originally handled periodical subscriptions for libraries have expanded to include **CD-ROM** subscriptions(Cox 1994, 14,15; Tedd 1995). *SilverPlatter* was an early entrant in the **CD-ROM** market and now publishes about 200 titles covering a wide variety of subjects(Tedd 1995).

CDPlus, now *Ovid Technologies* (Patrikios 1996,27), has moved from being a **CD-ROM** supplier to also being an online host service following its acquisition of *BRS* early in 1994. *DIALOG ONDisc* had about fifty databases by 1995 and was being used by more than 10 000 users in 100 countries(Tedd 1995).

Some database producers have come together and have merged databases on a similar subject into a **CD-ROM** product. **PERINORM**, for example, is a **CD-ROM** database containing information on standards from **STANDARDLINE** (*British Standards Institute*) **NORIANE** (*Association Francaise de Normalisation, AFNOR*) and **DTR** (*Deutsches Institut fur Normung, DIN*)(Hartley et al 1990, 58). **PERINORM** contains bibliographic entries for current and draft, European and international standards; it can be searched

using English, French and German.

A **CD-ROM** of British companies has been produced by *Jordans* in conjunction with the Belgian firm, *Bureau Marcel van Dijk*. This is known as **FAME (Financial Analysis Made Easy)** and incorporates software to analyze the company information retrieved (Hartley et al 1990, 58; Tedd 1995).

National libraries such as the British Library also publish databases on **CD-ROM** such as **Boston Spa serials** (450 000 serials holdings), **Boston Spa Conferences** (320 000 conference proceedings), and **Inside Information** (contents pages of 10 000 frequently requested journals) (Tedd 1995).

Many organizations publish their own data on **CD-ROM** and as the cost of mastering **CD-ROMs** is decreasing, and compact disc recordable (**CD-R**) products become available, this is becoming increasingly easier (Tedd 1995). Also the cost of replicating discs is estimated to have dropped from \$12 to \$3 per disc between 1987 and 1990 and the cost of **CD-ROM** drives dropped from \$1 500 to \$600 in the same period (Dreiss and Bashir 1990).

Traditional academic publishers such as *Oxford University Press (OUP)*, *Chadwyck-Healey*, *Elsevier*, *Bowker-Saur*, *Aslib* have also moved into **CD-ROM** production. The computer and entertainment industries have equally joined the **CD-ROM** industry. Examples of these last two are *Microsoft and Disney*, *Sega and Nintendo* respectively (Tedd 1995).

2.3.3. Changes in Search Interface

The searching of online systems of the 1970s such as *BLAISE* and *DIALOG*, was based on command languages and searches were usually done by trained intermediaries on behalf of the end-users (Tedd 1995). In contrast, **CD-ROM Retrieval software** were more user-friendly, providing menus with options for users to choose from by simply moving the cursor and pressing **arrow and function keys**.

During the 1990s there has been a move towards **Windows-based interfaces** with a **mouse** being used to point and click at **icons, highlighted text** or a cursor on the screen. Notable in this regard is **WinSPIRS**, the windows version of *SilverPlatter's* search software **SPIRS** (Tedd 1995).

There are now a number of search interfaces (i.e. **OPACS**, **CD-ROMs** from different publishers, remote online hosts) which librarians and end-users may need to be familiar with. One approach to enabling the searching of various databases with a known search interface is the adoption of the **Z39.50 protocol** (Tedd 1995).

2.3.4. Changes in Hardware

When **CD-ROM** was first introduced in the market-place there were very few drives available. The software that was used by different **CD-ROM** applications was also much less memory hungry; many of them would run in a *512 k* or even *256 k RAM* (Random Access Memory) environment (Bradley 1994, 67).

Today there is a multiplicity of drives - **stand-alones, internal drives, jukeboxes** or a *tower* that contains a number of **CD-ROM drives** (Tedd 1995; UNECA 1996). There are

also **portable drives** and drives which use **Small Computer Systems Interface (SCSI)**(Bradley 1994, 68). Drives that can be run on *386 based machines* are common while *486 machines* are becoming standard(Bradley 1994, 67), especially since 1994 when computers arrived with **CD-ROM drives** as standard equipment(UNECA 1996).

Laptops can also make use of **CD-ROM drives**(Bradley 1994, 67).

Originally, databases on **CD-ROM** could only be searched by a single user at a time. However, in 1988, *Cambridge Scientific Abstracts*, publisher of medical and scientific information developed a **multi-platter** facility that enabled four **CD-ROM disc drives** to be linked for simultaneous searching(Hartley et al 1990, 58). An American company *Meridian Data*, developed **CD-ROM disc drives** built especially for use with **local area networks**.

The growth in end-user searching has necessitated simultaneous use of the **CD-ROM** by more than one person. As a result there have been many developments in *net-working* the **CD-ROM** within the local environment(Tedd 1995).

2.4. ACCEPTANCE IN THE LIBRARY MARKET

It is generally accepted that libraries and information units were among the first users of **CD-ROM** during the 1980s(Tedd 1995). According to Herther, (1987) all types of libraries were targeted as major market areas for **CD-ROM** and other **optical** products. Libraries were also actively involved in **optical** product developments as they served as *beta test sites* for new products.

However, wide use of **CD-ROM** in libraries had a slow start. For example in 1987, only two public libraries in the U.K. were reportedly using **CD-ROM**(Tedd 1995). This number increased to 49 in 1989. It was only in 1991 that **CD-ROM** was being used in 101 libraries(Tedd 1995). Many librarians felt the pressure to acquire newer media and machines in order to appear state-of-the-art to their users and boards(Van Arsdale and ostrye 1986).

The **CD-ROM medium** has proved to be popular among library users. It is now perceived as an essential information retrieval tool in many libraries and has proved to be a qualified success as it provides a cost-effective means of bringing *computerized literature searching* to library users(Tedd 1995; Cox 1994, 15).

CD-ROMs have been particularly popular in school libraries and with children(Tedd 1995). Among illustrious products are *Microsoft's Musical Instruments* and *Microsoft's Encarta*.

Many libraries have been revolutionized by **CD-ROM**, both in terms of their appearance, as evidenced by the presence of banks of computer workstations, and in the nature of services which they can offer to users who now commonly expect to perform their own literature searches and to handle large quantities of text in electronic format(Cox 1994, 15).

The importance of **CD-ROM** to libraries is reflected in the increasing body of professional literature which it has spawned, characterized by journals such as *CD-ROM Professional* and *CD-ROM World* (formerly *CD-ROM Librarian*) in which the favourable impact of **CD-ROM** on libraries is frequently reported(Cox 1994, 15).

2.5. REQUIREMENTS FOR **CD-ROM** SEARCH SERVICE

The traditional **CD-ROM** arrangement consists of a workstation containing a microcomputer (complete with keyboard and monitor), a **CD-ROM drive**, and the selected **disc or database**(Lee et al 1993). The choice of a machine with large amounts of **RAM** (Random Access Memory) and a fast processing speed is critical(Bradley 1994, 68). As application software becomes more sophisticated, it will require greater and greater use of more free **RAM** within which to process the search that one is running.

Bradley, (1994, 68) recommends a 386 based machine with at least one megabyte hard disk memory as minimum requirement. A machine with two or three megabytes of **RAM** is better and if the applications software is going to make use of the Windows environment, it is recommended to go for four megabytes **RAM**. A 486 based machine with four to eight megabytes of **RAM** is recommended for multimedia applications.

Another requirement is a memory manager which allows the computer to access memory. One of the most commonly used memory managers is **QEMM**(Bradley 1994, 68) which is easy to install and is compatible with **CD-ROM** applications.

Since many **CD-ROM** applications make use of colour which assist users in their searches, it is advisable to buy a computer with a colour screen with *VGA (Video Graphic Adapter)* or *Super VGA (SVGA)* graphical capability. *SVGA* is recommended for applications which make use of graphics, which will be clearer and easier to see in higher resolution(Tedd 1995; Bradley 1994, 69).

Many computers will now come with DOS 6 and Windows 3.1 as standard. Although Windows software is not imperative, except for Windows based applications, DOS 6 is strongly recommended as it makes better use of memory by freeing more **RAM** for use with the application software(Bradley 1994, 69). The computer should have no 5.25" disk drive or if it does, this should be sealed to prevent users from mistaking it for a **CD-ROM drive** as this would cause damage to the disc and disk drive(Tedd 1995, Bradley 1994, 69).

The **CD-ROM drive** should conform to **ISO 9660** in order to accommodate discs from various producers(Tedd 1995; Bradley 1994, 70). The drive may be internal, external, portable or jukebox and should come with an interface card, cable and software(Bradley 1994, 71). Several drives may be linked together through *daisy chaining*. This is done by cabling the second drive to the first, the third to the second and so on. There is no need to install a separate interface card for each machine; each card should support four or eight drives without difficulty. The only thing to be done is to slightly change the software to inform the computer that it has more than one drive attached to it(Bradley 1994, 72).

In networking **CD-ROM drives**, you require netware such as version 4 of **Novell Netware** which can intercept the request to talk to an **optical disc** and translate it into a format that the **CD-ROM drive** can understand. A server may also be needed and a separate **optical file server** to take care of the **CD-ROM drives** that are linked into the network(Bradley 1994, 75).

Computers of high specification and running on appropriate DOS version for the networking software, and **CD-ROM drives** of more than 400ms are required. Depending

on the physical location of workstations, routers may be needed. Front-end menus, and Microsoft extension may also be required depending on the application. **CD-ROM** application software and solutions available include **CDNet**, **SCSI**, **OPTI-NET** and **LANTastic**(Bradley 1994, 77-78).

2.6. **CD-ROM'S SUITABILITY FOR DEVELOPING COUNTRIES**

The use of **CD-ROMs** is often presented as an ideal solution to the difficulties much of the developing world faces in identifying and delivering research information(Johnson 1994). **CD-ROM** is considered as an alternative to online searching for developing countries where telecommunication facilities are poor(Johnson 1994; Salanje 1995). Data shows that telecommunication diffusion in Africa is the weakest in the world with the least teledensity. ITU reports indicate that the average telephones per 100 people in Africa was 1.6 in 1993(Lishan 1995).

Jensen, (1995), noted that the average telephone density in Africa was one line per 250 people. Some countries are so telecommunication poor that there is less than one line per 1000 people and there may be no telephone links between the capital cities and other towns.

Lishan,(1995), further noted that Africa also lagged behind in the provision of business communication support such as packet switching and leased lines, including some other value added service. The number of leased lines were very limited and mostly used by airlines, banks and international organizations. Another problem he highlighted had to do with the maintenance of existing equipment: In some countries malfunctioning telephone equipment waits for months before a maintenance team comes to the rescue. Furthermore,

the maintenance process is slow even after problems are identified unless the team gets 'benefits'. Lack of management plans for maintenance and low salaries encourage corruption and sluggish maintenance processes. Other external factors such as the weather, and road and sewerage tunnel building make maintenance much more difficult.

Most developing countries have a limited amount of resources appropriated for information due to competing vital priorities such as food, housing, education, public health and public transportation(El-Hadidy 1994). **CD-ROM** affords users easy access to electronic data without any requirement for telecommunications networks. Users can spend as much time as they like searching without worrying about the cost of connection and usage charges as they would if using a telecommunication network(Johnson 1994). **CD-ROM** permits, under given circumstances, the easiest cost of information provision that has ever occurred and from the economic point of view, **CD-ROM** is suitable to high volume use which offsets the high fixed starting costs unlike online where costs skyrocket as the number of searches increases(Lunin and Schipma, 1988; El-Hadidy, 1994). One annual subscription gives unlimited access to several users and also makes for accurate and easy budgeting(Compton 1993, 6)

Lack of adequately trained manpower renders developing countries unable to negotiate online database searches in a cost-effective manner. **CD-ROM** on the other hand is easy to learn and use . Most retrieval systems for **CD-ROM** use conventional boolean logic methods for carrying out complex searches. They also have user interfaces facilitating browsing through the use of menus, refining a search, accessing a related online version and printing or saving the search results(Fox 1988; Salanje, 1995).

CD-ROM has proven appropriate for third world countries also because it can operate under difficult conditions such as heat, humidity, dust and the unstable power supply found in developing countries(United States National Research Council 1996; Johnson 1994; Compton 1993, 6). There are a number of databases which are appropriate for use in developing countries and there is also a possibility of producing local databases on **CD-ROM** to be used as **Public Access Catalogues**, **Union Catalogues** or sources of bibliographic data(Salanje 1995).

2.7. FUTURE PROSPECTS FOR **CD-ROM** TECHNOLOGY

CD-ROM has been termed as the *medium of the moment* in libraries(Berry 1992). Even in its infancy publishers and others had misgivings about the future of the technology. Herther, (1987) noted that although many librarians and publishers felt the urgency to jump into **CD-ROM** technology, there was uncertainty surrounding the new medium then. McSean and Law, (1990) also expressed scepticism about the future of **CD-ROM** in terms of technological limitations, commercial considerations and practical difficulties. They believed **CD-ROM** to be a *transient technology*.

Cox, (1994, 19) however, argues that there is every reason to expect that the rapid growth in the number of commercially available **CD-ROM** products in recent years will continue. He nevertheless, points out that **CD-ROM** is not the only medium suitable for end-user searching, as shown by the emergence of **high-capacity magnetic disks** for local database storage and the use of the **JANET network** to provide free access at the point of use to major data sets.

These alternative media offer advantages in terms of speed and currency. At the present time, however, they are not applicable to many databases and the immediate future of **CD-ROM** at least looks secure(Cox 1994, 19). Cox further argues that even if some of the larger databases migrate to other media, **CD-ROM** will continue to appeal to libraries for coverage of narrower subject areas or full-text reference sources.

The future of **CD-ROM** may further be cemented by moves towards a common user interface or the implementation of a *data exchange standard*. The latter gives control to the user in accessing different databases(Cox 1994, 19).

A further development that may foster the future of **CD-ROM** is the emergence of a degree of *inter-operability* between at least some of the various **disc formats**(Howorth 1992). Desmarais (1990), Bonime (1991) and Brandit (1991) show that these formats, notably, **CD-ROM Extended Architecture (CD-ROM XA)**, **CD-I** and **Digital Audio Interactive (DVI)**, provide a platform for multimedia and interactive video applications in libraries and could build upon the primarily *textual* focus of **CD-ROM** to propagate electronic books and tools for computer-assisted learning.

Cox, (1994, 19) concludes that there remains the possibility that some *new data storage medium* will emerge to leave **CD-ROM** trailing in its wake, and it is for this reason that the long term future of **CD-ROM** cannot be predicted with any certainty. Lancaster, (1989) earlier on observed that it seemed reasonable to assume that completely new types of *electronic publications* would emerge in the future, perhaps on *media* yet to be invented. Such publications may span the entire range of resources then handled by libraries - from textbooks to instructional manuals to novels to poetry to children's picture

books - and they may be available in a wide variety of formats.

Hanson, (1994, 244) observed that the information community is on the verge of a *new era of information delivery* based on the technology of *networking* and it is in this context that **CD-ROM** needs to be seen. *Networking CD-ROMs* provides advantages such as easier access to a range of **CD-ROMs**, access from the user's own work station, simultaneous access by several users to the same database and better security(Tedd 1995). Disadvantages of networking **CD-ROM** include slower response time, need for technical expertise to set up and manage the network, and increased charges imposed by the suppliers because of providing network access to the **CD-ROM** titles.

Also there may be clashes between software both on the user workstation and on the network and other problems may arise since not all **CD-ROMs** search software were written with networking in mind(Tedd 1995). At least two suppliers (*SilverPlatter* and *CDPlus*) are tackling the problem of networking **CD-ROMs**(Tedd 1995; Bradley 1994, 79). One such solution is *SilverPlatter's Electronic Reference Library (ERL)* in which a number of universities have been involved in testing the software which is based on a *client-server architecture*(Tedd 1995).

At the 1994 *UKOLUG (UK Online User Group) conference*, it was predicted that as workstation and magnetic storage costs decreased, it would be possible to get more people searching more data faster than they were then able to do and that **CD-ROM** would be used as a distribution and backup medium(Bradley cited in Tedd 1995).

Hanson,(1994, 253) also viewed **CD-ROM** as a *transient technology* and concludes that the *interim* period in which **CD-ROM** features prominently in local information strategies has a few years yet to run. Similar conclusions were reached by Royan, the Librarian of the University of Stirling when delivering the *annual UKOLUG* lecture at the *International Online Information Meeting* in 1993(Tedd 1995). He foresaw the future principal areas of **CD-ROM** use in libraries in the distribution of relatively small and stable databases; for archival storage; for use in sites where there is little technical support or network infrastructure; for distribution of local updates to databases; as backup or alternative to **OPAC**; for document delivery and for **multimedia** consumer products.

Tedd, (1995) concludes by noting that it is likely that networking, with the spread of the **Internet**, will have most effect on the future of **CD-ROM**. There are already examples of companies involved in the **CD-ROM** industry making their products available on the Internet. *UMI* for instance, plans to duplicate its **CD-ROM** and make both text and image databases available on the Internet.

2.8. SUMMARY

Online information retrieval has been defined as the use of the computer in searching for and retrieving of selected information from the data held on a computer. In the past magnetic tapes were used as a storage medium for data and the databases were usually within the organization where the search was being conducted. Nowadays, the data can be on a remotely located computer hard disk, owned by online service hosts, who have also developed software systems to enable remote users to search the databases on their computers. This requires the use of telecommunication networks to access the remote computer to carry out the search.

CD-ROM is also considered a form of online information retrieval since the computer is used to retrieve the information stored on the database. **CD-ROM** appealed to the library market as it provided for database searching without the use of telecommunications services and also it held out the possibility of offering unlimited access at a guaranteed cost and encouraging library users to conduct their own searches through simpler retrieval facilities with liberal use of menus and help screens.

Today **CD-ROM** has been widely accepted in the library market and elsewhere and has been advocated as a suitable technology for developing countries which have poor telecommunications facilities. With the change in CD-ROM producers, coverage, interface, hardware and the growth in the number of commercially available CD-ROM products, including , multimedia and hypermedia, as well as networking, **CD-ROM** databases will continue to appeal to libraries in the foreseeable future.

CHAPTER THREE

CD-ROM TECHNOLOGY IN AFRICA WITH SPECIAL REFERENCE TO ETHIOPIA

3.0. INTRODUCTION

CD-ROM technology was introduced to Africa by database vendors/producers and donor agencies who initiated projects involving the production, delivery and application of **CD-ROM**(Salanje 1995). This chapter outlines some donor agencies and various **CD-ROM** projects they initiated in different institutions in African countries. Certain donor agencies support projects in specific disciplines while others are not restricted to particular disciplines. In a few cases, institutions have introduced **CD-ROM** of their own initiative.

The introduction of **CD-ROM** to Ethiopia is briefly discussed, with examples of institutions that offer **CD-ROM** search service and those with **CD-ROM** capability. The various applications to which the technology has been put to use are also discussed.

3.1. CD-ROM TECHNOLOGY COMES TO AFRICA

The *Commonwealth Agricultural Bureau International (CABI)*, an agricultural database producer, was instrumental in bringing **CD-ROM** technology to Africa. In 1986 CABI devised a project to test **CD-ROM** in developing countries so that donors might discover how best to assist libraries of developing countries to utilize **CD-ROM** technology and products(Salanje 1995; Dusink 1994). A **prototype disc** was produced and sent to a selected group of 40 libraries in 24 countries(Salanje 1995), including some African countries such as Botswana, Egypt, Ethiopia, Kenya, Malawi, Mali, Nigeria and Zimbabwe(Salanje 1995).

Donor organizations such as *IDRC (International Development Research Centre)*, *World Bank*, *CTA (Technical Centre for Agricultural and Rural Cooperation)*, *the CGIAR (The Consultative Group on International Agricultural Research)* and *NAL (National Agricultural Library of USA)* contributed toward funding of the project (Salanje 1995). *IDRC* took care of training and evaluation in developing countries and findings of the project were published in 1988 (AAAS 1993, 50; Afework 1988). Results of the project were so encouraging that *CTA* was moved to launch its on programme in 1989 which was executed by the *Royal Tropical Institute (KIT) of the Netherlands* (Dusink 1994).

CTA's CD-ROM Pilot Project for ACP (African Caribbean and Pacific) countries (Dusink 1993, 36; Dusink 1994), was aimed at improving national self-sufficiency in the dissemination of scientific agricultural information and to introduce computer technology in the third world information services as a way of encouraging the production of local databases.

African countries included in this project were Cameroon, Kenya, Mali, Zaire, Zambia and Zimbabwe (Dusink 1993, 37). The institutions covered comprised ministerial libraries, university libraries and regional development centres, with qualified documentalists among the staff. In 1990 more African countries were brought into the project, namely; Burkina Faso, Chad, Cote d'Ivoire, Ethiopia, Nigeria (Tamuno 1993, A-27), Sierra Leone, Sudan and Tanzania. The project was further widened in 1991 and 1992 by including more countries (Dusink 1993, 37).

The libraries involved were equipped with **CD-ROM** workstations and provided with funds to cover operational costs on items such as paper, toner, floppy disks. Service contracts

were also covered and assistance was provided for document delivery through *KIT* or coupons (*UNESCO, British Library* etc.)(Dusink 1993, 37).

An essential component of the *CTA-CD-ROM* program is training of personnel in the recipient institutions. Basic computer skills, introduction to computerized bibliographic databases and search strategies, and the use of thesauri, form part of the programme. Trainees are familiarized with databases such as **AGRIS**, **CAB Abstracts**, **KIT Abstracts on CD-ROM**, **SESAME** (a database covering French literature on tropical agriculture and rural development), the **CGIAR Compact Library prototype disc** and *CIMMYT's (International Maize and Wheat Improvement Centre) maize Germ-plasm Bank on CD-ROM*(Dusink 1994). Six months after installation of equipment, sites receive an evaluation form, which must be completed if they are to continue to receive *CTA* assistance.

In 1987 a project was proposed for **TROPAG** (Abstracts for Tropical Agriculture) databases to be published on **CD-ROM** (along with a full text of a substantial proportion of the indexed items) and supplied with the necessary hardware and training to 46 African countries(Salanje 1995). The **TROPAG** database is now on **CD-ROM** together with **RURAL** (Abstracts on Rural Development). Its first edition was released in 1990(Salanje 1995).

3.2. OTHER DONOR-FUNDED INSTITUTIONS AND PROJECTS

Carnegie Corporation of New York has been funding **CD-ROM** installations since 1988 when the University of Zimbabwe Medical School Library was provided with funds to establish **CD-ROM** capability in the library(Newa 1996, 15; Patrikios 1993, A-21-22).

The University library was assisted to initially purchase one microcomputer and two **disc drives** and to subscribe to **MEDLINE**. Funding to purchase additional workstations and training of technicians, establishing a network of five workstations with greater capacity and faster document delivery, was also approved later on(Patrikios 1993, A-22).

The University of Dar es Salaam was also assisted to purchase two **CD-ROM** workstations, their accessories, a laser printer and initial subscription to two **CD-ROM** database in 1992(Newa 1996, 16), and in 1995 to acquire a four-drive workstation. The *Kenya Medical Research Institute* and the *Sierra Leone Science and Technology Information Network (SALSTINET)* were also financed by Carnegie Corporation in implementing **CD-ROM** technology(AAAS 1993, 48).

SAREC (The Swedish Agency for Research Cooperation with Developing Countries) is another agency that has funded **CD-ROM** technology in Africa. Although it has no specific **CD-ROM** program, *SAREC* is willing to provide **CD-ROM** hardware, training, and subscriptions to any of the participating institutions. Beneficiaries include University of Dar es Salaam, Addis Ababa University Library, and institutions in Zimbabwe and Mozambique(AAAS 1993, 54).

Overseas Development Agency (ODA), and the *US Agency for International Development (USAID)* each supply hardware and software within project support. For example, in 1991, the Central Medical Library at Yaba in Nigeria received a **CD-ROM** work station from *USAID* through its Project on Combatting Childhood Communicable Diseases(Oyesola 1993, A-18). *ODA* provides funding for the compilation of **PESTCD** and **TREECD**, both produced by *CABI*(AAAS 1993, 46).

The *Health Foundation* funds projects in medical institutions. The University of Ghana Medical Library for instance, was financed to install a **CD-ROM** workstation in 1990, comprising a microcomputer, **CD-ROM** drive and printer(Addo 1992). In addition the **MEDLINE** database produced by *Cambridge Scientific Abstracts* was provided and installed. Other databases were added in 1991 and thereafter, including **POPLINE** and some full text databases. *Health Foundation* also installed a workstation in Zambia at the University Medical Library in 1992. Ten years of **MEDLINE** on **CD-ROM** were also donated(Shakakata 1993, A-25).

The *Rockefeller Foundation* has also supported **CD-ROM** activities in African countries. An example of institutions funded by the foundation is the Bunda College of Agriculture in Malawi. **CD-ROM** was introduced here in 1991 with H.W. Wilson's **Biological Abstracts and Agricultural Index**. By the end of 1992, there were three **CD-ROM** drives and eight **CD-ROM** databases. By 1995 there were twenty three databases on various aspects of agriculture(Ngwira and Safalaoh 1995).

The *WHO Regional Office for Africa Library* installed **CD-ROM** facilities in late 1988. The library subscribes to the *SilverPlatter* version of **MEDLINE** and has been selected as a **POPLINE** site by the Johns Hopkins University Centre for Communication Programs(Hunter 1993, A-12).

Banque Internationale d'information sur les Etats Francophones (BIEF)/International Bank of Information on French Speaking Countries, a **CD-ROM** producer, assists selected francophone institutions in developing countries through a programme to subsidize serial subscriptions, including subscriptions to **CD-ROM** databases. Participating libraries pay 50 per cent of the subscription costs for the first year, and are expected to pay all costs

after a period of three to four years(AAAS 1993, 47). One example of an institution so financed is the University of Cheikh Anta Diop, Dakar(Sene 1993, A-23).

At the *Association of African Universities*, **CD-ROM** was introduced in response to the needs expressed by the researchers working in the *African Regional Food and Nutrition Project (FNP)*. The project was supported by a special *EEC* fund under the Lome III Convention and is meant to address the precarious food situation of the African continent(Bart-Plange 1993, A-9). *KIT* conducted **CD-ROM** training on site for ten days. Areas covered included database searching using *SPIRS (SilverPlatter's Information Retrieval Software)*, repackaging using *Word Perfect*, marketing and trouble shooting. **The Food Science and Technology Abstracts (FSTA)** was the first database to be acquired, followed by **SESAME**.

Search requests are received from some twenty two countries all over Africa ranging from Egypt to Namibia, Cote d'Ivoire to Kenya. Most search requests made by e-mail and the results sent by post. Students of Nutrition and Food Science Department at the University of Ghana are required to search the databases at AAU for a literature review which they submit as part of their final year project.

The *American Association for the Advancement of Science (AAAS)* through its *Sub-Saharan African Programme* has played a major role in promoting **CD-ROM** use in Africa. In 1990 AAAS carried out an inventory of computer and **CD-ROM** capability in Sub-Saharan African University and Research Libraries. This was followed by two *specialized CD-ROM seminars for decision makers*. The first was held in October 1992 in Harare during a three-day symposium organized by the *Research Council of Zimbabwe(ZRC)* for scientists from Southern Africa. The second seminar was arranged in conjunction with the **Eighth General Conference of the Association of African Universities** in Accra in January 1993.

The special seminar was targeted at vice chancellors and senior administrators attending the **Association of African Universities** assembly. Together with this seminar, a two-day workshop for African research librarians was organized on how to market **CD-ROM** services. Intended for information professionals who already have **CD-ROM** capability

in their own institutions, the workshop covered marketing principles and methods, evaluation techniques and document delivery issues(AAAS 1993,1-2).

AAAS Sub-Saharan Africa Programme has also launched a biannual newsletter, **CD-ROM for Development** which is supplied to institutions on request at no cost. AAAS has also produced a number of publications on **CD-ROM** such as Marketing **CD-ROM** services:a manual for African research librarians, based on the Accra workshop mentioned above; **CD-ROM for African Research needs:some basic guidelines**, also based on the two seminars described above. Recent publications include; Berhanu and Levey (1996) and **CD-ROM for African research needs: guidelines on database selection**.

In January 1994 *AAAS Sub-Saharan Africa Program* launched the three-year Pilot Project described in chapter one. This project came to an end in December 1996 and was terminated with a final workshop where sustainability issues were discussed, among other things. Other African Universities not involved in the pilot project have also been supplied with **CD-ROM** databases by AAAS.

3.3. INTERNALLY INITIATED PROJECTS

A few African institutions have initiated **CD-ROM** activities and supported the service without donor intervention. The University of Science and Technology (UST), Kumasi, Ghana, for example, acquired a **CD-ROM** drive in 1992. After installation it was test run using discs borrowed from other libraries(Darko-Ampen 1993, A-12). The library planned to utilize part of the periodicals' budget to subscribe to **CD-ROM** databases or request for the library budget to be increased.

The *Centre for African Family Studies (CAFS)*, a training institute on population and family planning is another self-starter. **CD-ROM** service was introduced in 1991, with the installation of **POPLINE on compact disc**(Azorbo 1993, A-8). *CAFS*'s staff were acquainted with **CD-ROM** through an information seminar organized as part of the installation activities. *CAF*'s information and documentation service personnel underwent training on the use of **POPLINE** after which a demonstration of the **POPLINE** database was mounted for all *CAFS*' staff as well as others from institutions and organisations within Nairobi.

Four South African medical libraries of the Universities of Witwatersrand (Wits), Pretoria, Orange Free State (OFS) and Cape Town (UCT) jointly purchased a subscription to **ADONIS** (a subscription service which supplies high quality full text copies of journal articles- see chapter two, item 2.4.1.). The contract agreement allowed each site to have its own **discs** at a reduced total subscription cost. After a year's trial UCT withdrew from the consortium due to the insufficient use of the **ADONIS** system(Meyers 1996, 93).

In all, established tertiary institutions in South Africa (i.e. those universities that were formerly well subsidized under the apartheid regime) have online bibliographic services as well as **CD-ROM** service. However, electronic accessibility to literature has been a recent development in historically black universities. The University of the Western Cape, for example, only acquired **CD-ROM** some two to three years ago(Abrahams et al. 1996, 75).

3.4. CD-ROM PROMOTIONAL ACTIVITIES

All institutions that acquired **CD-ROM** have tried to publicize the service to varying degrees. Promotional activities have included demonstrations, putting up posters and fliers, publishing of newsletters, describing the service in Library Guides, incorporating **CD-ROM** into orientation programmes, conference, workshops and seminar presentations (Ngwira and Safalaoh 1995; Azorbo 1993, A-9; University of Zimbabwe Library 1996; University of Dar es Salaam Library 1996; Yumba 1996; Mosuro 1996; Addo 1992).

3.5. SIGNIFICANCE OF CD-ROM TECHNOLOGY TO AFRICA

The information and communication technology scene in Africa is changing. It has been proven that ICT (Information Communication Technology) can be successfully used to support science and research (United States National Research Council 1996, 3). However African scientists and engineers still face isolation because of poor or expensive communication channels and because of a chronic shortage of funds, particularly hard currency for purchasing books, periodicals and subscriptions to international sources of information.

CD-ROM offers a practical solution to the information isolation experienced by researchers, information professionals and scientists in many developing countries, including Africa (United States National Research Council 1996, 11). As early as 1989, at a meeting sponsored by the *OIA (Office of International Affairs)* of the *National Research Council* of the United States, in Nairobi, **CD-ROM** was identified as one of the key information technologies for African scientists. **CD-ROM's** potential for delivering full text documents to areas where the source documents are hard to obtain, speed, and

user-friendliness make it specially suitable to the African situation.

CD-ROM offers opportunities for making African national heritage, culture, tourist attractions and all forms of structured information widely available. It helps to reduce Africa's dependence on the developed world both for technology and its own information(UNECA 1996). The average information user in Africa who is unable to afford online access and full Internet connection due to limitations in bandwidth and costs can rely on **CD-ROM** databases for their information needs. Coupled with low cost networking **CD-ROM** also promises the distribution of information to remote areas in Africa(UNECA 1996).

Wide experience in mastering developing countries databases has been gained over the last ten years(i.e. *IDRC, CTA and Pan American Health Organisation - PAHO*). *The Pan African Development Information System (PADIS)* is working on the first Africa based **CD-ROM** using information from Africa(UNECA 1996).

3.6. CURRENT TRENDS AND FUTURE PROSPECTS

Information retrieval from **CD-ROM** databases is becoming increasingly popular in Africa. There has been a slow, but definite increase in usage as more awareness is created among the users. Most institutions have plans to expand the service by increasing the number of available **CD-ROM** readers, using portable drives to demonstrate to more users, conducting user training, networking **CD-ROM** and other activities(University of Malawi Libraries 1996; University of Zimbabwe 1996; University of Ghana 1996; University of Dar es Salaam 1996; Mosuro 1996; Yumba 1996).

In some institutions **CD-ROM** has triggered increased use in the library journals collections, more requests for interlibrary loans, and demand for original documents is high in all institutions concerned to the extent that most of the universities recognize the need to sustain **CD-ROM** service after the termination of donor support.

The University of Ghana, for example set aside \$10 000 to purchase document delivery services. University of Dar es Salaam also plans to use *UNESCO* coupons for document delivery. Other universities have enlisted the backing of university authorities to get commitment for support of the **CD-ROM** service (Berhanu and Levey 1996). In yet other institutions some users are now starting to accept the idea of supporting the service in monetary terms (Masanja 1997).

3.7. **CD-ROM TECHNOLOGY IN ETHIOPIA**

The first institution to introduce **CD-ROM** service in Ethiopia was *ILCA* (*International Livestock Centre for Africa*), now *ILRI* (*International Livestock Research Institute*). In 1986 the then *ILCA* was among the first six *CGIAR* centres selected for the evaluation of the **CAB ABSTRACTS CD-ROM** as a medium for providing information to developing countries (CAB International 1986).

The **CD-ROM** reader was donated by *CTA* which was assisting in the pilot project test for the prototype **CD-ROM**. The evaluation bore encouraging results. *ILRI* still has the prototype disc and meanwhile other databases have been acquired such as **AGRICOLA**, **AGRIS**, **CD-ROM DIRECTORY**, **COMPUTER SELECT** (a database of computer literature) and **SESAME**.

CD-ROM search service at *ILRI* is a success story. At present there is a **CD tower** on which ten databases have been mounted and can be accessed on a network from anywhere in the institution. The library has six microcomputers with **CD-ROM** drives. Some databases have not been put on the network due to licence agreements which demand that they be used for single users. Plans are under way to acquire a tower which can hold more **CD-ROMs**.

Although Addis Ababa University Library received a **CD-ROM** workstation under the *SAREC Library Support Programme* in 1989, **CD-ROM** service was not availed to its users until the early 1990s due to the novelty of the technology and the unavailability of user databases. The Geophysical Observatory of the Addis Ababa University acquired **CD-ROM** in 1990 for the purpose of searching earthquake catalogues (TekleMichael 1994, 36).

In the 1990s different government and non-governmental organisations started to incorporate **CD-ROM** in their information service. The *Institute of Agricultural research (IAR)*, an institute with centres in various regions of Ethiopia, acquired **CD-ROM** facilities as a donation from *CTA* through its *ACP* countries project. The workstation (i.e. IBM PS/2 model 30286 microcomputer with 30 MB hard disk drive and two floppy disk drives, a philips **CD-ROM** drive and laser printer) was installed in the Library of the Main Centre in Addis Ababa by the Royal Tropical Institute (*KIT*) of the Netherlands.

Subscriptions to **CAB Abstracts** and **TROPAG** and **RURAL** were provided as well as training of staff. Other databases later added were **AGRIS**, **AGRICOLA** and **PESTCD** (Gashaw 1993, A-13). Requests for **CD-ROM** searches are now received

through e-mail from the 17 centre libraries scattered throughout the country and search results are sent back through e-mail. Acquisition of reprints or copies of the primary literature identified in the search was a major constraint. The use of *UNESCO* coupons to acquire cited documents from foreign sources, however minimized the problem.

Regional and international organizations such as *PADIS* and *British Council* also acquired **CD-ROM** facilities. *The National Scientific and Technological Information and Documentation Centre (NSTIDC)* also acquired **CD-ROM** workstations in 1991. Armaur Hansen Research Institute acquired **CD-ROM** facilities in 1993. Today **CD-ROM** is increasingly becoming popular with facilities extended to include Alemaya University of Agriculture and various units of the Addis Ababa University (TekleMichael 1994, 36, 37).

Most of the **CD-ROM** facilities mentioned above were acquired through gifts and grants.

The databases are mostly bibliographic, some with abstracts. A few are full text and some directory type. **Multimedia** titles are increasingly becoming available. Among the users of **CD-ROM** are researchers, students, policy and decision makers, faculty staff and administrators. Other uses of **CD-ROM** apart from literature searching are **SDI**, catalogue card production by, for example, Addis Ababa University Library, bibliographic verification and abstracting service.

CD-ROM service has been publicised through demonstration, brochures, newsletters and use of posters. Due to the few workstations available (usually one or two **CD-ROM** drives), searching of databases is mainly performed by library staff, except for institutions like *ILRI* where **CD-ROM** is networked.

Some user statistics are maintained by some institutions, but they are not comprehensive.

Non-governmental schools such as the *Sandford English Community School*, the *International Community School (ICS)* have acquired **CD-ROM** for their school libraries and most popular Microsoft's Encarta Multimedia Encyclopedia. Pupils browse through the **CD-ROM** and enjoy it enormously.

3.7.1. Future Prospects

Similar to the rest of Africa, **CD-ROM** technology is gaining ground in Ethiopia. More institutions are acquiring **CD-ROM** and more users are becoming aware of the potential of **CD-ROM** as an information medium. Institutions already offering **CD-ROM** services are expanding and seeking ways of improving the quality of service offered. **CD-ROM** technology definitely has a future in Ethiopia.

3.8. SUMMARY

CD-ROM technology was introduced to Africa by database vendors/producers and donor agencies who initiated projects involving the production, delivery and application of CD-ROM.

Such donor initiated projects basically involved the provision of hardware and databases. In some cases training on searching of the databases, and assistance with document delivery as well as operational costs have been included in the projects. AAAS has played a vital role in promoting CD-ROM use in Africa through its CD-ROM Pilot Project.

In Ethiopia CD-ROM was introduced by CABI and Addis Ababa University Library received its first CD-ROM workstation from SAREC under its Library Support Programme. CD-ROM is becoming increasingly popular in Africa as institutions are planning to expand their CD-ROM capabilities. However, this is not easy as there are the

usual problems associated with donor funded projects, such as maintenance and servicing of equipment and also the sustainability of the service.

In spite of the above problems, CD-ROM is said to offer a practical solution to the information isolation experienced by researchers, information professionals and scientists in Africa.

CHAPTER FOUR

ADDIS ABABA UNIVERSITY LIBRARY SYSTEM

4.0. INTRODUCTION

The Addis Ababa University Library System (AAULS) is a sub-system of the Addis Ababa University (AAU). This chapter therefore, starts with a brief description of the larger system including its historical background, the objectives of the University, the organizational structure, and the various Faculties/Colleges and Institutes comprising the AAU. The Addis Ababa University Library system is then discussed, including the application of information technology. Much of the information in this chapter was gathered through interviews and discussions with various persons in the University System. Publications of the Addis Ababa University, and internal reports and papers were also consulted.

4.1. THE ADDIS ABABA UNIVERSITY

4.1.1. Historical Background

Higher Education in Ethiopia started with the founding of the University College of Addis Ababa in 1950 at the Arat Kilo Campus. In the following decade, a number of mutually independent colleges and faculties were established. All the institutions of higher education were finally brought together under one Central Administration, in 1961, to form what is today Addis Ababa University (AAU) with its Main Campus at Siddist Kilo and five other Campuses which house eleven faculties and colleges as well as a School of Graduate Studies and a Continuing Education Division (Addis Ababa University 1979; Addis Ababa University 1994,1).

4.1.2. Objectives of the Addis Ababa University

The objectives of the Addis Ababa University are:

- # to search for, cultivate, preserve and transmit knowledge;
- # to provide education that fully develops the personality and strengthens the respect for human dignity, by promoting mutual respect, understanding, friendship and tolerance free from ethnic, nationality, sex, religious and other prejudices;
- # to inculcate the dignity of work and dedication for the well being of the society;
- # with a view to enhancing the socio-economic development of the Ethiopian people, to provide the country with competent men and women, imbued with a sense of social purpose and trained in sciences, technology, the arts and various other professions;
- # to conduct research and studies, in an objective and dispassionate way and free from any bias, on different fields and disseminate fruitful results thereof(AAU 1994, 1).

4.1.3. Organisation and Management of AAU

AAU has **Governing Bodies** and **Executive Bodies** under which it is organized and administered. There are two Governing Bodies, namely, the **Board of Governors** and the **Senate**(AAU 1994, 2).

4.1.3.1. The Board of Governors and Senate

The **board of governors** consists of a chairman and five members designated by the Government. The **Board** formulates policies governing the University, approves the plans and budgets of the university and determines the conditions for employment and

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administration of the academic staff of the University(AAU 1994, 2).

The **Senate** consists of the President of the University as Chairman, the Deans of the Faculties, the Registrar of the University and representatives of other units of the University designated by the **University Board**.

4.1.3.2. Executive Bodies

The Chief Executive of AAU is the President, who is responsible for the efficient and appropriate functions of the University. He is assisted by two Vice Presidents, namely: The Academic Vice President and the Vice President for Business Administration. Under the Academic Vice President's Office are the Academic Programmes Office, the Dean of Students Office, the Office of the Librarian, the Office of the Registrar, the Research and Publications Office, the Testing Centre and the Addis Ababa University Press(AAU 1979; AAU 1994, 2). At Faculty level, the Dean is the head as well as the academic and administrative chief of the faculty. The departments within the faculties are headed by Heads of Departments(AAU 1979; AAU 1994, 2).

4.1.4. Faculties/Colleges of the AAU

AAU has eleven teaching Faculties, Colleges, Institutes or Schools, namely: Faculty of Business & Economics (FBE), Faculty of Education, Institute of Language Studies, Faculty of Law, School of Information Studies for Africa (SISA), Faculty of Medicine, School of Pharmacy, Faculty of Science, College of Social Sciences, Faculty of Technology, and Faculty of Veterinary Medicine.

In addition, there is a School of Graduate Studies, a Continuing Education Division and five *Research Institutes*. These are: the Geophysical Observatory, the Institute of

Development Research (IDR), the Institute of Ethiopian Studies (IES), the Institute of Education Research (IER) and the Institute of Pathobiology(AAU 1994, 3).

The Research and Publications Office is responsible for overall support and coordination of research and related activities under the guidance and advice of established boards and committees such as the Senate Research and Publications Committee (SRPC) and the Faculty Research and Publications Committee (FRPC) and Board of advisors appointed for each Research Institute(AAU 1994, 11).

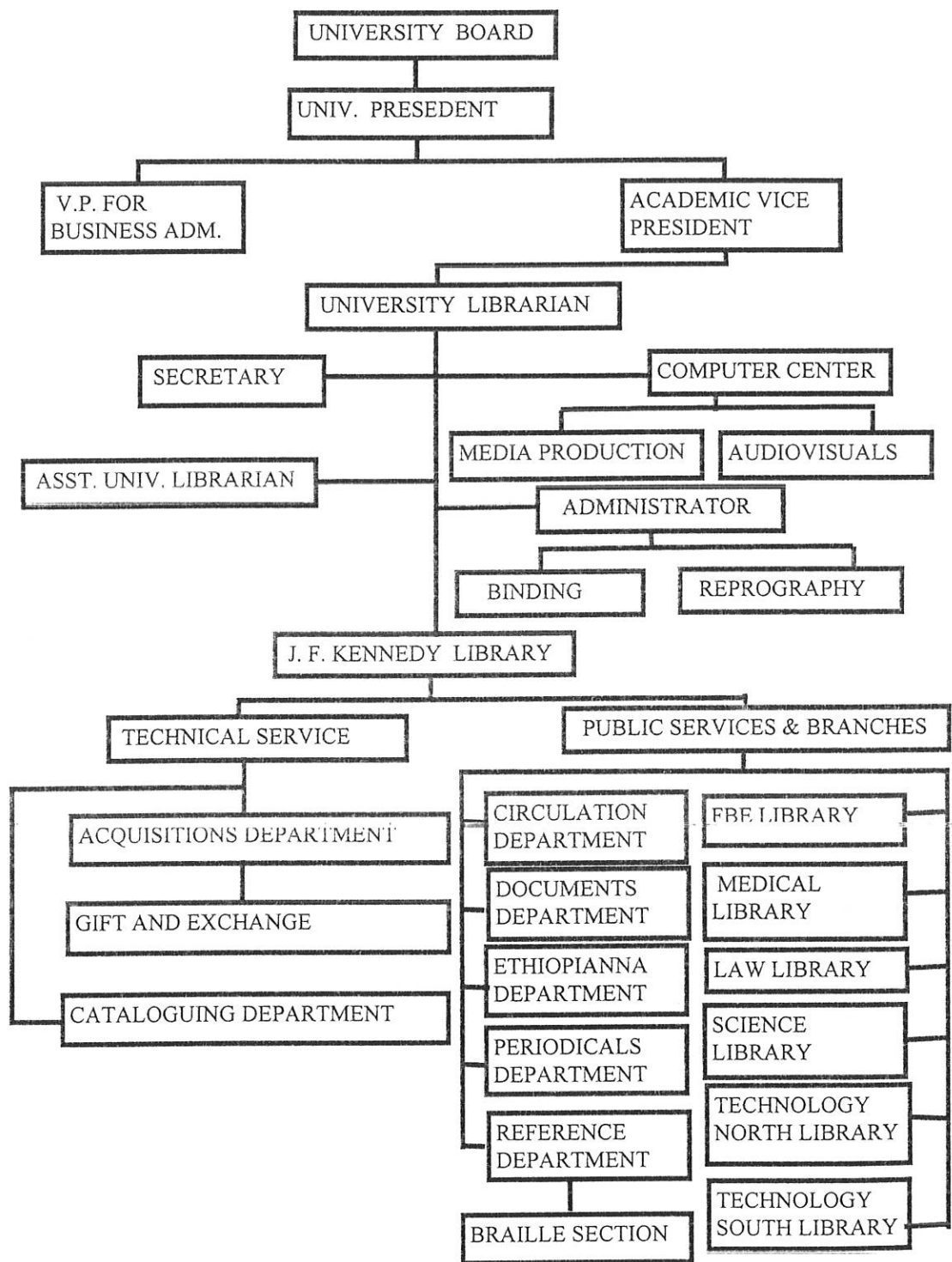
4.2. THE ADDIS ABABA UNIVERSITY LIBRARY SYSTEM (AAULS)

The AAULS dates back to the establishment of the University, and presently consists of a Central Library (Kennedy Library), housed in the John F. Kennedy Memorial Building on the Main Campus, with libraries located near the faculties they serve.(AAU 1994, 12).

Figure 4.1. shows the structure of the University Library System.

In general technical functions and processes such as acquisitions, cataloguing, and binding are done centrally by the Main Library. All branch libraries offer circulations services. There is a loans desk which handles the charging and discharging of library materials for long period loan, and the reserve counter dealing with short loan of materials for on the spot reading.

Figure 4.1 Organizational Chart of the Library



SOURCE: Addis Ababa University Libraries, Computer Center. 1997. Proposal for networking of the AAU Libraries for information resource sharing. Unpublished material.

4.2.1. Objectives of the AAULS

4.2.1.1. General Objective

The general objective of the AAULS is to serve instructional and research objectives of the University. It has the responsibility to promote library services consistent with the aims and objectives of the institution.

4.2.1.2. Specific objectives

The specific objectives of AAULS are:

- # to render library service that can meet the needs of undergraduate studies, in relation to approved curricula;
- # to assist the teaching staff in the preparation of teaching materials and in keeping up-to-date in the respective subject fields;
- # to meet the needs of postgraduate studies in relation to approved curricula;
- # to support research and advancement of knowledge in the major disciplines of the humanities, social and natural sciences, particularly as related to Ethiopia; and
- # to provide general reference and lending services to the University as a whole as well as to the educated readers beyond the walls of the University.

In view of the absence of adequate library and information facilities in the country, the University Libraries cater also for the information needs of other government organizations and educated public, although in a limited way.

4.2.2. Introduction of Computers and CD-ROM Databases

Computers were introduced to Addis Ababa University Library in 1989 through a donation of two computers and **CD-ROM** databases by the Swedish Agency for Research Cooperation with Developing Countries(SAREC) as part of the Library Support Project. The Addis Ababa University Library System first aimed at applying microcomputers to house-keeping operations, in particular, cataloguing. To this end, BiblioFile database was acquired to be used in the production of catalogue cards. Secondly, the Library System sought to retrieve information based on **CD-ROM** databases and a number of **CD-ROMs** were therefore, subscribed to.

As soon as the databases were acquired, experimentation by a few faculty members on the new technology was started. Full articles of the referenced materials were obtained through the British Library coupon system.

4.2.3. Development of the CD-ROM Search Service

The faculty members who had experimented with the new means of information retrieval were very much impressed with the capability of **CD-ROM** to provide quick access to bibliographic references where previously they used to spend hours and hours browsing through the indexes and abstracts. The provision of full articles through the document delivery system was most appealing to the users(Interview with the University Librarian).

After the experimental period, the **CD-ROM** search service was extended to academic staff and graduate students in all faculties of AAU(Addis Ababa University Library Interface Committee, 1996). However, the growth in usage has been gradual as can be seen from table 4.1. below.

Table 4.1. showing the number of search requests from 1991 to 1996

Jan 1991-Dec 1993	1994	1995	Jan-July 1996
293	200	691	408

Source: Proposal document for a Laptop with **CD-ROM** drive submitted to AAAS, by AAULS, 1996.

In 1994 the Medical Faculty Library acquired its own **CD-ROM** reader and databases donated by some well-wishers residing in the United States. In 1996 the Technology (North) Library was also provided with **CD-ROM** facilities.

4.2.3.1. AAAS **CD-ROM** Pilot Project

As shown in table 1, the years 1991 to 1993 had an average of 98 requests per year. From 1994 upwards there was a marked increase in the number of search requests. This was evidently due to the AAAS **CD-ROM** Pilot Project which was launched in 1994 and lasted until the end of 1996. AAAS provided seven bibliographic databases and full text databases in the sciences and social sciences and provided assistance with document delivery by DHL (Addis Ababa University Libraries **CD-ROM** Interface Committee 1996).

Other donors such as the UN, IDRC and Silver Platter supplied some **CD-ROM** databases as well, but the most frequently used databases proved to be those provided by AAAS. The **CD-ROM** search service was boosted, not just by the donation of databases, but also by the various activities such as the workshops and seminars mentioned in chapter three (item 3.2). Through them, staff in charge of the **CD-ROM** search service have been assisted with ways of publicizing the service among the potential users. Posters, demonstrations, publication of the **CD-ROM** newsletter, notices and talks, are the various ways in which Addis Ababa University Libraries have tried to promote **CD-ROM** usage.

As it has already been stated in earlier chapters, the AAAS **CD-ROM** Pilot Project came to an end in December 1996. Although the Addis Ababa University Library system has benefitted from the project, it should be noted that the termination of the Pilot Project has some implications with regard to sustainability of the service. The University Libraries must find money to continue subscriptions to the seven databases donated by AAAS, and also find a way of providing document delivery which has also terminated with the project. The hardware also need to be serviced and maintained and this too involves costs.

4.2.3.2. Significance of the **CD-ROM** Service to Addis Ababa University

The **CD-ROM** search service coupled with document delivery has to some extent helped to fill the gap created by the discontinuation of journals subscriptions since 1988. **CD-ROM** has proved to be a cost-effective means of accessing current information, especially with the assistance of AAAS. A shift was made from heavy dependency on out-dated monographs for graduate thesis work, Research and Development activities and course teaching(Addis Ababa University Libraries **CD-ROM** Interface Committee 1996).

There have been a number of problems that the library has faced in delivering **CD-ROM** service. Firstly, the number of machines available for **CD-ROM** search service has been insufficient. Secondly, other than the seven databases donated by AAAS, it has been difficult to provide full articles requested from the other databases. Thirdly, publicity and demonstration was hindered by the absence of a portable **CD-ROM** facility that can be used for demonstrations in the various branch libraries. And finally, the lack of **CD-ROM** search facility in every branch library has been a major constraint.

4.2.4. Computerization of the Library System

The need to computerize the entire Addis Ababa University Library System was felt and different funding sources were approached both at home and abroad for assistance (Addis Ababa University Libraries Computer Centre 1997). One of the institutions with which Addis Ababa University Library has had contacts with, in this regard, is the National Science and Technology Commission which serves as a national coordinator for SAREC (Swedish Agency for Research Cooperation in Developing Countries).

Recent discussions held with the National Science and Technology Commission resulted in the drafting of a project proposal for the networking of AAULS. The project was intended to address the entire library system (Addis Ababa University Libraries Computer Centre 1997), giving priority to selected functions and units within the system, such as information storage and retrieval facilities (mainly using CD-ROM and indigenous databases and the provision of an OPAC).

4.2.5. Internet Connectivity

Addis Ababa University Library has been connected to the Internet as of January 1997. The Library has to pay a monthly subscription fee equivalent to US 50 dollars to the Ethiopia Telecommunications Authority which allows for thirty hours of use of the Internet connect time. To date training of librarians on how to browse through the net has already taken place. Two Internet operators underwent intensive training at the British Council and thereafter trained other librarians.

Although internet connectivity may be seen as the solution to accessing CD-ROM databases, in the AAULS it has not proved to be the case. Internet services have not yet

been extended to the user community due to some limitations. As stated in the preceding paragraph the costs involved for the given connect time are rather high. The search skills that have been acquired by the staff still need to be developed further in order to make effective use of the available connect time. The poor telephone lines also need to be improved before the Libraries can benefit for Internet connectivity.

4.3. SUMMARY

The general objective of the AAULS is to serve instructional and research objectives of the university. In this regard provision of timely information is vital. CD-ROM's capability to provide quick access to bibliographic references was a welcome change to the university community, especially when coupled with the delivery of full documents such as through the British Library and the AAAS. Nevertheless, the growth in the number of users has been gradual.

AAAS CD-ROM Pilot Project boosted the CD-ROM service in the AAULS. However, the termination of the Pilot Project has some implications with regard to sustainability of the service. The University Libraries must find money to continue subscriptions to the seven databases donated by AAAS, and also find a way of providing document delivery which has also terminated with the project. The hardware also need to be serviced and maintained and this too involves costs.

Plans to network the AAU Libraries are underway with priority being given to networking CD-ROM. This a major step in the right direction.

Although internet connectivity may be seen as the solution to accessing **CD-ROM** databases ,in the AAULS it has not proved to be the case. This is due to the costs involved for the given connect time which are rather high. The search skills that have been acquired by the staff also need to be developed further in order to make effective use of the available connect time. The poor telephone lines also need to be improved before the Libraries can benefit for Internet connectivity.

CHAPTER 5

PRESENTATION AND ANALYSIS OF RESEARCH RESULTS

5.0. INTRODUCTION

This chapter presents the results of the survey that was conducted to find out the effectiveness of the **CD-ROM** search facilities in the Addis Ababa University Library System. Information about the respondents is given first, followed by the presentation of the survey results. Much of what was discussed in the interviews with the University Librarian, the Librarian of the Medical Faculty and the persons in charge of **CD-ROM** at Kennedy Library and the Medical Library, has been covered in the preceding chapter (items 4.2.2., 4.2.3., 4.2.3.1., 4.2.4., 4.2.5.). For this reason, only a few highlights are presented in this chapter.

The analysis of the research results are presented thereafter and finally a summary of the analysis is made. The term *user community* shall be used in referring to both users and potential users of the **CD-ROM** service.

5.1. PRESENTATION OF RESEARCH RESULTS

5.1.1. Information on the Respondents

Out of the 194 questionnaires that were distributed, 106 were returned. However, only 101 were included in the analysis since four had been returned uncompleted while one was discarded because it was not properly filled. Figures 5.1. and 5.2 show the number of respondents by category and by faculty respectively. The term respondents refers to the number of usable questionnaires. Only 27 of the respondents had used the **CD-ROM** search facilities while the remaining 74 had not used it at all.

Fig 5.1. Showing the Number of respondents by category

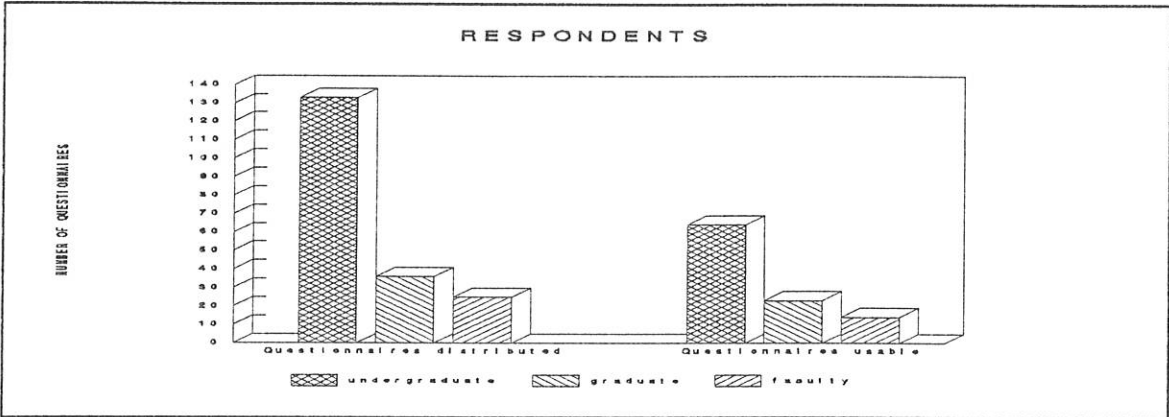
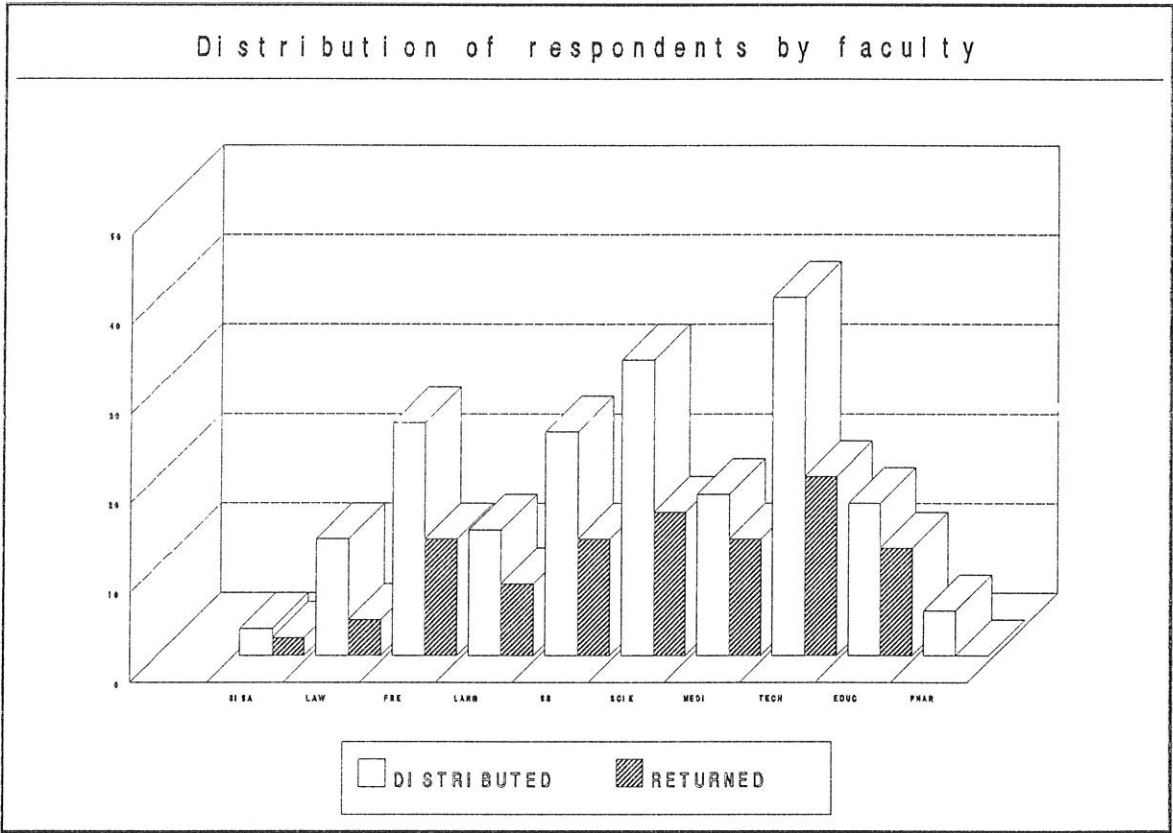


Figure 5.2. Showing Respondents by Faculty



5.1.2. Survey Results

Those of the user community who had used **CD-ROM** were asked to indicate the means by which they came to know about the **CD-ROM** Service in AAULS. The results show that there were more users who came to know about the **CD-ROM** facilities through means other than the Library System's means of communication as shown in Figure 5.3.

Eighteen (66.7. %) of the users indicated that they came to know about **CD-ROM** for the first time at AAULS while the remaining nine knew about **CD-ROM** and had used it elsewhere. Users were asked to indicate the **CD-ROM** databases they had used and Table 5.1. shows the response in frequencies and percentage in each major field.

Figure 5.3. Indicating the means through which users came to know about the CD-ROM Service in AAULS.

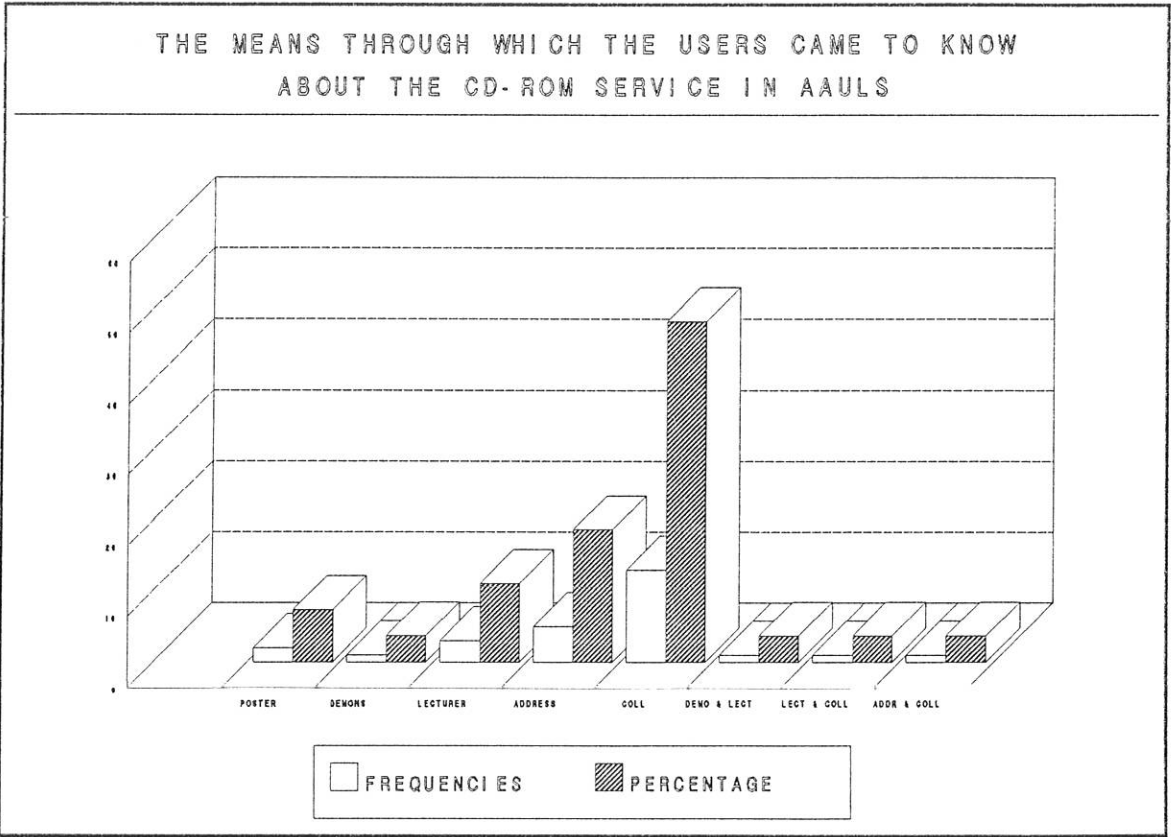


Table 5.1. Showing Usage of databases

DATABASE NAME	FREQUENCIES	PERCENTAGE
Medline	5	18.5
EMBASE CD:Obstet.	1	3.7
Primary Care Lib.	1	3.7
Medline + Popline	1	3.7
Med. + Popline + New Eng. J. of Med.		
DAI CD-ROM	1	3.7
Social Sc. Source	1	3.7
NTIS Bibliographic	1	3.7
PAIS + Psyclit	1	3.7
Social Sc. Index + Social Sc. Source	1	3.7
ERIC	7	25.9
Life Sc. Coll.	3	11.1
Earth Sc. Disc	1	3.7
Sc. Cit. Index	3	11.1
Life Sc. Coll. + Sc. Cit. Index	2	7.4
LISA	3	11.1
Higher Education Information System	1	3.7
World Magazine Bank + Global Books in Print + Higher Education Information System	1	3.7
TOTAL	27	

Those of the user community who had used **CD-ROM** were requested to indicate how often they used the databases and also the extent to which they got satisfactory results. Their responses are shown in Figure 5.4. and Figure 5.5. respectively. Those who indicated non-satisfaction were requested to state the reasons for their dissatisfaction and they expressed disappointment at being given lists of books and journals which they could not use immediately and some did not even know what to do in order to get the source documents.

Figure 5.4. Showing how often users searched the databases

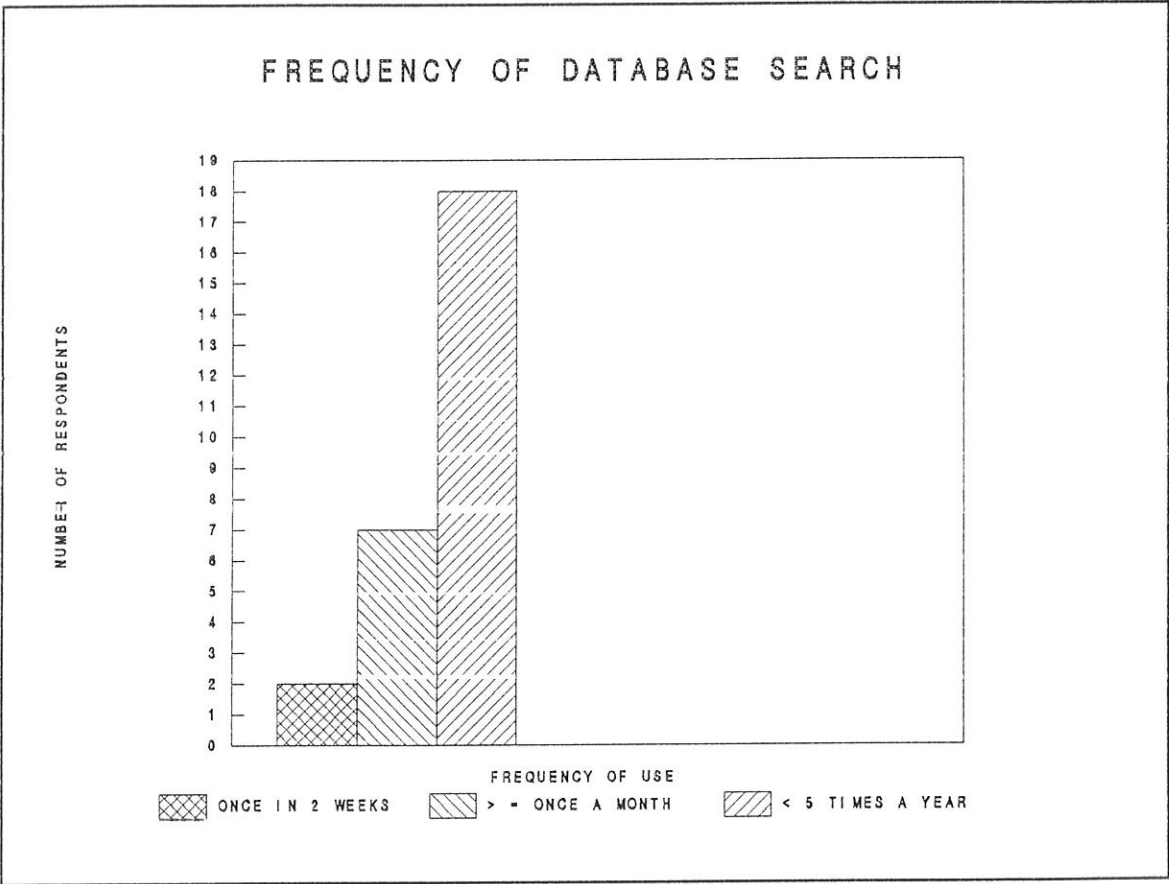
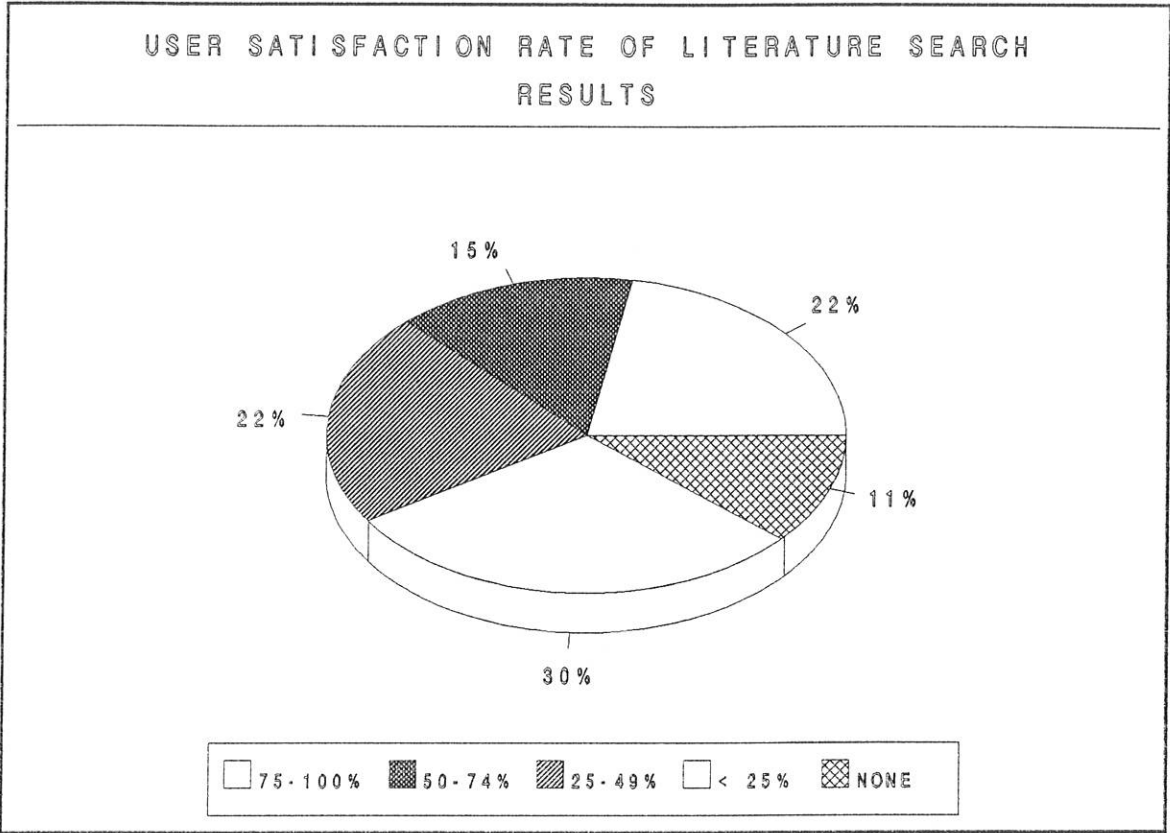
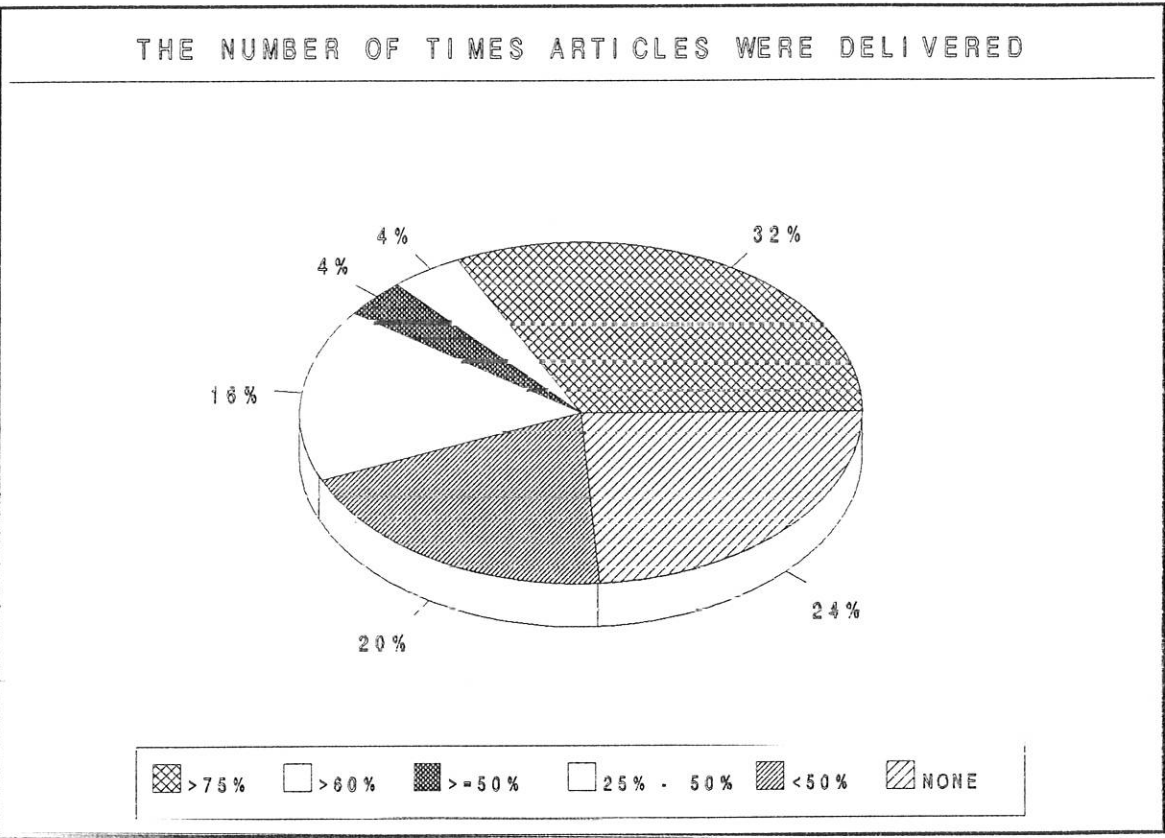


Figure 5.5. Showing User satisfaction rate of literature search results



Those users who had requested for supply of full articles through the document delivery system were asked how often they had the requested documents delivered. Their responses are shown in Figure 5.6.

Figure 5.6. Showing number of times articles were delivered



The users were also requested to indicate whether the requested documents were supplied in time for the intended purpose and the results are indicated in Figure 5.7. The various uses to which the searched information was put are shown in Table 5.2.

Figure 5.7. Showing Timeliness of the articles delivered

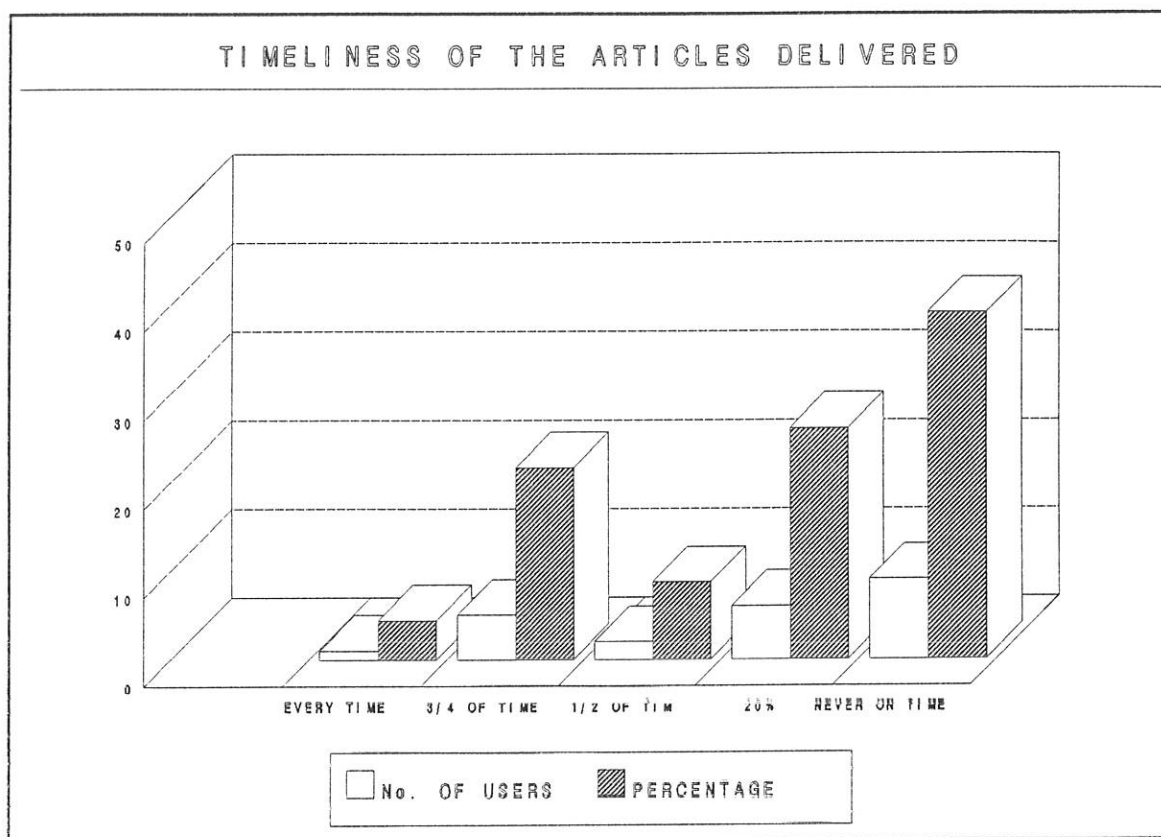


Table 5.2. Showing How information from the CD-ROM searches was used

USE	Frequencies*	Percentage*
Teaching & Research	14	60.9
Assignment & Thesis	14	60.9
Other Uses	4	17.4

* Users indicated more than one way in which information was used

Users were also requested to state how they had benefited from the CD-ROM Service, what they found to be the weaknesses of the CD-ROM search facilities in the AAU Libraries, and what ought to be done in order to improve the service. Their responses are depicted in Figures 5.8., 5.9. and 5.10. respectively.

Figure 5.8. Showing How users benefited from CD-ROM

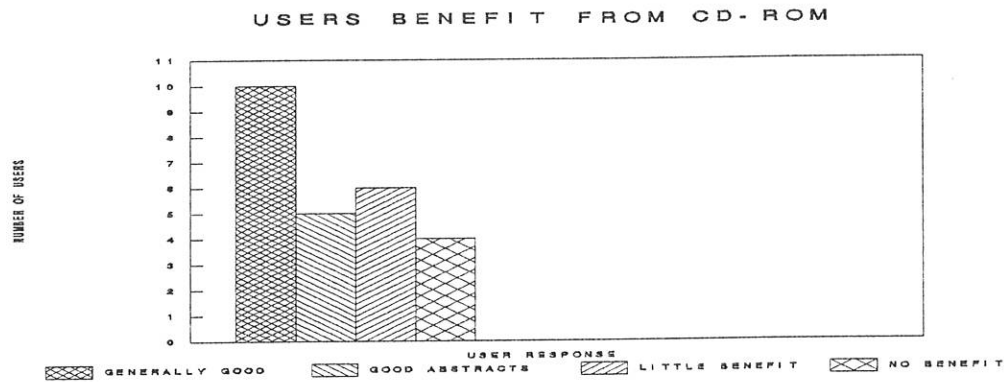


Figure 5.9. Indicating the Weaknesses of the CD-ROM Service in AAU Libraries.

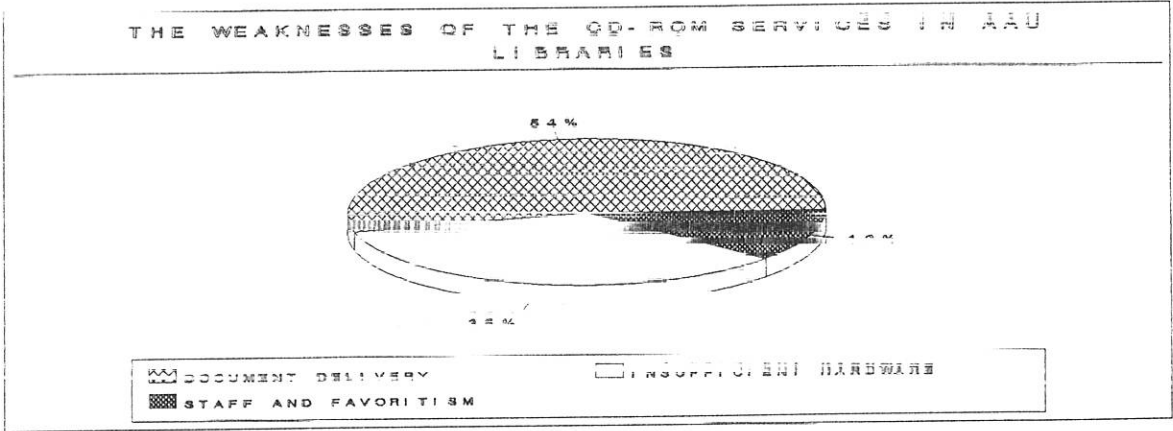
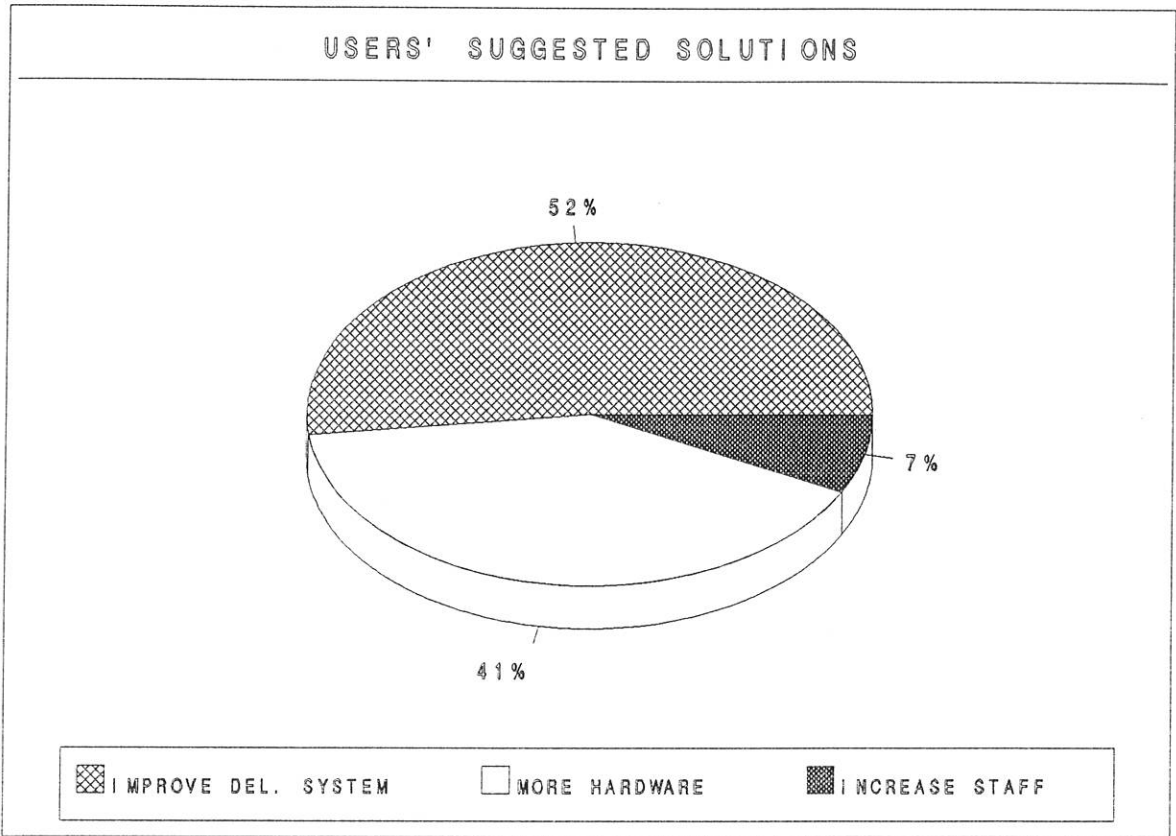


Figure 5.10. Showing the Users' suggested solutions to the identified weaknesses.



5.1.2.1. Non-users

Seventy four of the respondents had never used the **CD-ROM** Service in the AAULS and they were asked to state the reason why and their responses are shown in Table 5.3.

Table 5.3. Indicating Reasons for not using **CD-ROM**

Reason for non-use	Frequencies*	Percentage*
Do not know CD-ROM	39	52.7
No knowledge about service	37	50.0
No knowledge that relevant databases are available	4	5.4
Other reasons	4	5.4

* Some respondents indicated more than one reason

The respondents who had not used CD-ROM were also asked whether they would be interested in using any of the **CD-ROM** databases listed. A positive response was indicated by 45 (60.8%) of the respondents while the remaining 29 (39.2%) gave a negative response. The 45 respondents also indicated the **CD-ROM** databases they were interested in searching and this is shown in table 5.4.

Non-users were also asked whether or not they had read or seen the **CD-ROM** Newsletter produced by the Libraries. Only 6 (8.1%) of the non-users affirmed having seen or read the Newsletter while the remaining 68 (91.9 %) said that they had never seen the Newsletter.

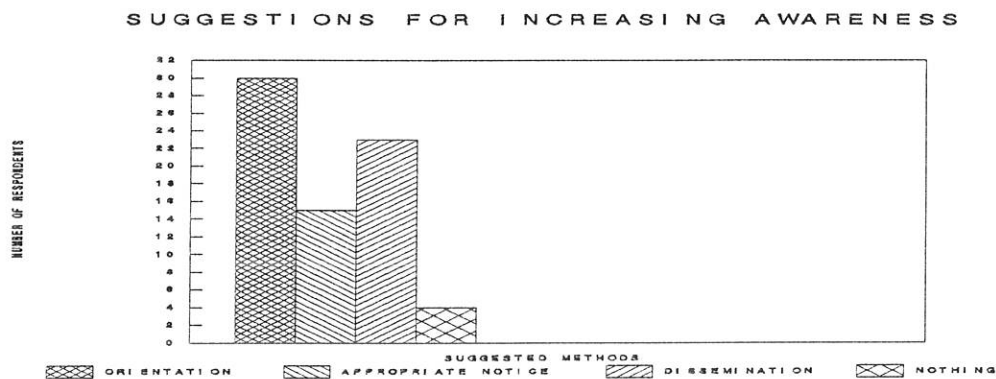
Table 5.4. Showing **CD-ROM** databases non-users would like to search

CD-ROM databases	No. of Respondents	Percentage
Social Science	10	22.2
Technology	14	31.1
Science	6	13.3
Medicine	4	8.9
General	6	13.3
Eric	4	8.9
LISA	1	2.2

Those respondents who had not seen the notices and newsletters used by the Libraries to publicize the service nor heard about the demonstrations and other means of publicity were

asked to suggest what the Libraries ought to do in order to create more awareness among potential users. Their suggestions are shown in Figure 5.11.

Figure 5.11. Showing Suggestions on how to increase awareness among the potential users.



5.1.2.2. CD-ROM vs Journal Subscription

All the respondents were asked whether they were in favour of cancelling subscriptions to some journals in order to subscribe to **CD-ROM** databases. Of the 101 respondents 98 indicated their views as shown in Figure 5.12. The respondents were also asked whether they would be willing to pay for the full articles to be delivered to them and the views of the 94 who responded to the question are depicted in Figure 5.13.

Figure 5.12. Indicating Respondents' views on cancelling journal subscriptions in favour of **CD-ROM** databases

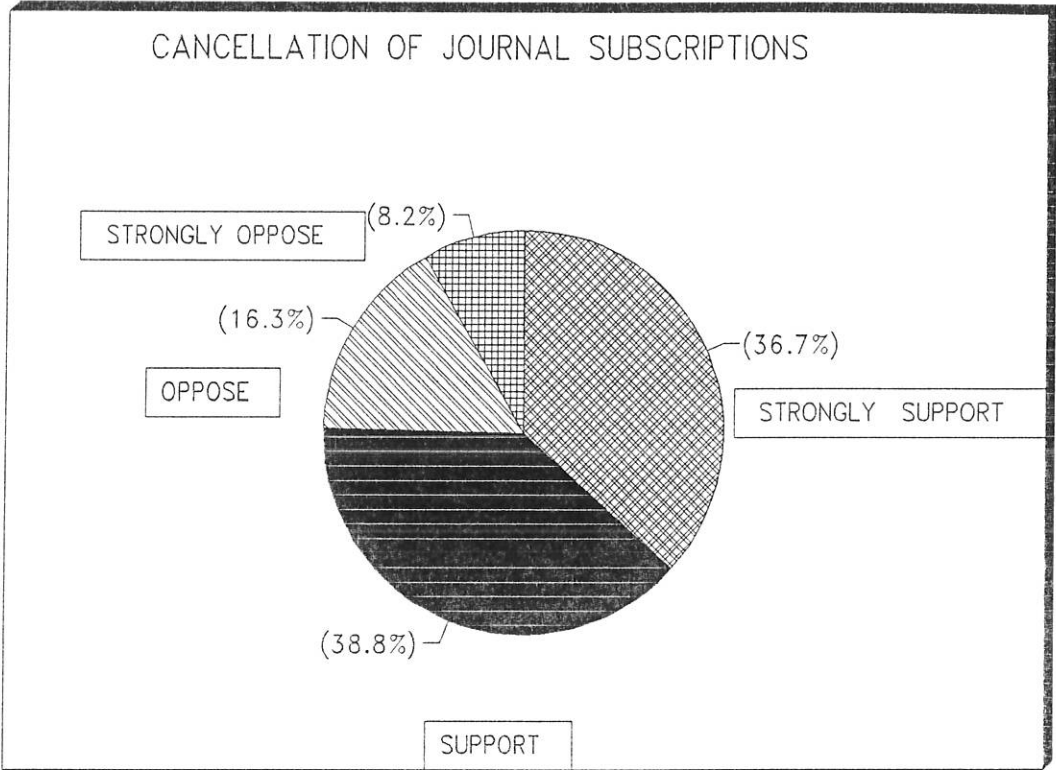
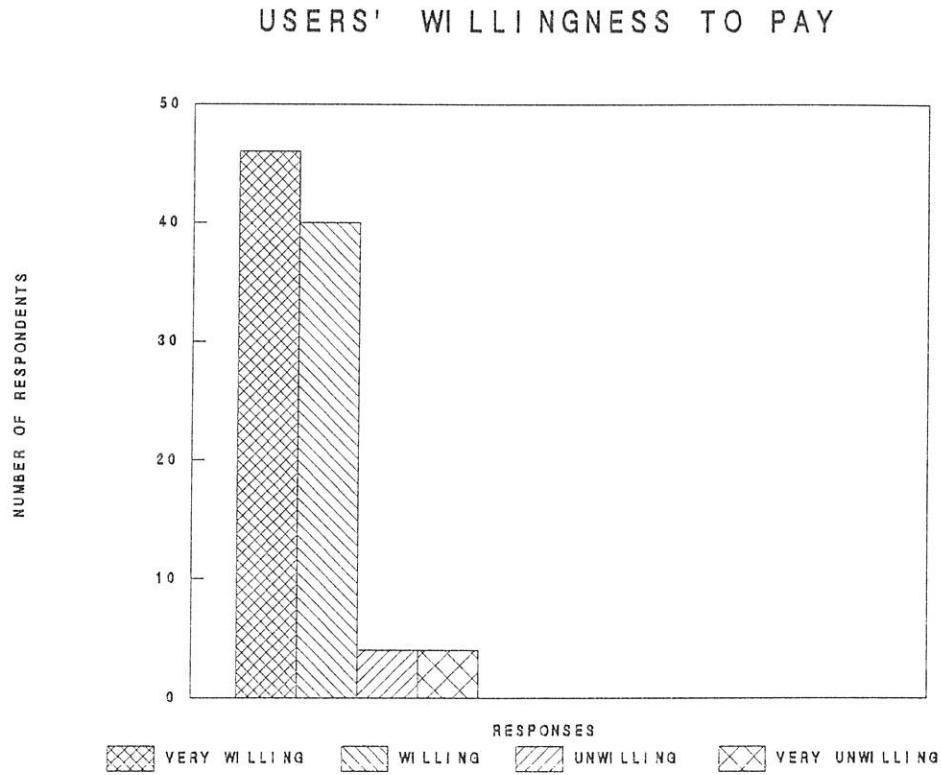


Figure 5.13. Showing Respondents' views on paying for full articles to be delivered to them.



5.1.2.3. Interview Highlights

From the interviews, it was apparent that prior to introducing **CD-ROM** technology to the University Libraries, there was no study conducted to determine the need for the new technology. Rather it was assumed that being an institution of higher learning researchers, teachers and students would use the technology.

All the Library staff interviewed affirmed that AAULS had carried out a number of promotional activities on **CD-ROM**, such as putting up posters and notices, and sending letters to Departmental Heads. The most effective means, however, according to them,

was through the Newsletter, which was being distributed to all branch libraries and departments.

In response to the need to increase the user base, the Libraries endeavoured to acquire more hardware, for example two more computers with **CD-ROM** drives were purchased in 1996 to reduce pressure on the then one **CD-ROM** reader available in Kennedy Library, although one computer had to be shared with the Cataloguing Department. The Technology (North) Library was also provided with a **CD-ROM** reader at the beginning of 1996, thus increasing the **CD-ROM** Centres to three (i.e. Kennedy Library, Medical Library and Technology (North) Library. A portable **CD-ROM** reader was also acquired late in 1996 to be used for demonstrations.

Kennedy Library appointed one member of staff dedicated to literature search from **CD-ROM** databases. According to him, he was not pressurized by the number of search requests. Although a request would take a day or two to be fulfilled, users could state when they needed the search to be performed right away and would be given priority. The search process through the intermediary involves the user completing a search request form where he/she indicates the search terms or key words, which the intermediary will use to conduct a search on the **CD-ROM** databases. The search results are downloaded onto a diskette which the requester had submitted with the search request and the diskette is collected after a day or two and thereafter, the user goes and checks through the search results, which in most cases are journal citations.

The person in charge of **CD-ROM** Service at the Medical Library admitted that there was pressure due to the number of requests being made and to control the situation, a schedule

was prepared for requests to be searched and results to be provided accordingly.

When asked about the provision of search results on diskette, it was explained that this was done on the assumption that students would go and use the Computer Laboratory at the Graduate School. Concerning the articles ordered by the users, personnel in **CD-ROM** Centres were asked about available mechanisms for ensuring that other users were informed about the availability of the articles after the persons who ordered them had used them. In the case of the Medical Library the articles were deposited at the Medical Library and were manually checked when users asked for information. Articles ordered through Kennedy Library were deposited in the Periodicals Library and other users would be verbally informed to go and check at the Periodicals Library in the Catalogue.

As to ensuring that the same article was not ordered twice, Medical Library had no means of ensuring that and had ordered the same articles more than once and since the provider of the document delivery did not appear to mind, no efforts were made to avoid ordering the same article more than once. Kennedy Library had a mechanism for ensuring that an article was ordered once only. Before approving the request for document delivery, users would get the request signed by personnel in the Periodicals' Library to confirm that the article had not been ordered.

Problems that were faced while dispensing the service were:

- # Having to search on a subject where the appropriate database was not available, for example, ERIC was used instead of LISA;
- # Malfunctioning of the printer
- # Lack of a budget for running costs to acquire paper, ribbon etc.

Delays of document delivery through Padis

Single workstations and insufficient manpower

These problems however, were on the way to being solved as has been discussed earlier. The Libraries also had budgeted for the following databases to be subscribed to in the 1997/98 academic year: **Social Science Index with abstracts**, **ERIC**, **Life Science Collection**, **Applied Science and Technology Index**, and **PAIS**. As has been discussed in chapter five AAU Libraries have plans to network **CD-ROM**.

All persons interviewed starting from the University Librarian asserted that Internet would not eclipse the **CD-ROM** Service since the costs involved were too much for the Libraries to afford. Other than paying for connect charges, they would still need to subscribe to Internet Services. The pressure of time and costs therefore, still existed as in the case of online searching. Secondly, the telephone lines were not reliable.

Three of the interviewees all felt that the use being made of the databases justified the cost of maintaining the service, while one interviewee felt that some databases were underutilized, for example, some full text journals whose hard copies were also being donated unsolicited for and there was no guarantee of continuing receiving them. Users would opt for the hard copies.

The issue of restricting the **CD-ROM** Service to faculty and postgraduate students was broached. The interviewees at the Medical Library stated that there was no rule to say that undergraduate students should not use **CD-ROM**, but rather it had to do with the education system. It was explained that undergraduates were given lectures, prescribed

text books and references in medicine to read and had no time to think of consulting any other source of information. A number of undergraduates had come to seek certain information on something they had heard in class and they were provided with information using **CD-ROM**.

In the case of Kennedy Library, it was explained that the limited number of workstations could not accommodate more users. The nature of the programmes being offered also did not necessitate indepth literature searching as provided by **CD-ROM**.

The University's unwritten policy on information is that it should be provided freely, the library therefore, has no mandate to request users to pay for information provided. This has not helped matters when it comes to supplying full documents to **CD-ROM** users considering that the library has no budget for **CD-ROM** running costs (interview with **CD-ROM** Personnel).

5.2. ANALYSIS AND INTERPRETATION OF RESULTS

The objective of the study was to assess the effectiveness of the **CD-ROM** Search Service in meeting the research and teaching needs of Addis Ababa University. Something can be said to be effective if it produces the intended results(Thompson 1993). Considering the expenses involved such as hardware, database subscriptions, consummables (ink, ribbon, paper etc.), document delivery and staff time, the best justification for **CD-ROM** is to be able to point to a growing number of satisfied consumers who utilize **CD-ROM** databases in their studies, teaching and research(Levey 1993, vii).

5.2.1. Use of CD-ROM Service

According to the survey results, only 26.7% of the surveyed sample have actually used **CD-ROM** which shows that the facilities are underutilized. The major reason for the low number of users evidently is their lack of awareness of the existence of the service as shown in table 5.3. More than half of the non-users do not even know what **CD-ROM** is. The results also showed that 5.4 % of the non-users did not know there were databases relevant to their area of interest.

5.2.2. Ability to Satisfy User Needs

5.2.2.1. Satisfaction Rate of Literature Search

An increase in the number of search requests made and the number of records downloaded is not in itself an indication that the

CD-ROM Service is meeting user requirements as has been proved by the survey results. More important is the extent to which users are satisfied with the downloaded information.

As depicted in Figure 5.5. only 22.2% of the users indicated having had satisfactory search results three quarters of the time and above. Users who had satisfactory results at least half of the time total 37%. The larger part of the users (62.9%) have recorded satisfaction rate of less than 50% and 11.1% have indicated that they had had no satisfaction at all.

5.2.2.2. Supply of Full Documents

The survey revealed that, of the users who requested for the full documents to be supplied, 32% had received the requested documents more than three quarters of the time, 38% had received the requested documents at least half the time, 60% had received the requested documents less than 50% of the time and 24% had not even had their requests fulfilled

(refer to Figure 5.6).

5.2.2.3. Timeliness of Document Delivery

Out of the 23 users who responded to the question on whether the documents requested for were supplied in good time to be used for the intended purpose, only 1 (4.3%) indicated having always received the documents in good time as shown in Figure 5.7. Five (21.7%) users indicated that they received the documents in good time three quarters of the time, 2 users (8.7%) received the documents on time half the time, 6 (26.1%) received the documents on time 20% of the time and 9 (39.1%) never received the documents they requested on time.

5.2.3. User Perceived Weaknesses of the Service

As indicated in Figure 5.9. 26 of the 27 users responded to the question about the weaknesses of the service. The weaknesses were divided into three broad categories. The **Document Delivery System** category embraces a whole range of problems indicated by 14 (53.8%) of the users as shown in the figure. The first problem mentioned is time lag from the submission of a literature search request to the time of getting the actual document.

Users normally have to wait for a day or two before they can receive search results on diskette. Then after identifying the item for which they need the full document, the requests have to go to the Periodicals Library to get confirmation that the required articles have not been ordered before. Once this is done the requests have to go back to the Library Computer Centre for approval and subsequent dispatch for document delivery. The arrival of the requested document may go up to a month or longer. There is also a

limit to the number of pages (not more than 20) a document should have in order for it to be ordered.

The second problem mentioned is that due to the use of an intermediary, the search results downloaded onto the diskette contain too many irrelevant materials through which the user must browse before finding the relevant information, all which is time consuming. This is confounded by the fact that some students have difficulty accessing a computer for them to read the information provided on diskette. Another problem mentioned is that even though users may get useful references with good abstracts, some do not know how and where to obtain the full documents.

Some users felt that the **CD-ROM** search facility was discriminatory because firstly, it was not open to all and secondly, because it required users to provide a diskette for downloading of the search results. Those users who were unable to provide the diskette were deprived of the opportunity to benefit from the service.

The second category of user identified problems is **Insufficient Hardware** which also includes a lack of printing facilities, the limited number of **CD-ROM** drives which forced users to travel from their campus to the Main campus in order to make use of the service. Even users from the main campus expressed misgivings about the fact that they had to depend on one centrally located **CD-ROM** workstation and some faculty members found it cumbersome to have to walk to the library every time they needed to use **CD-ROM**. The number of users who indicated the problems in this category was 9 (34.6%).

The third category of user identified problems had to do with **Favouritism and Staff**. In this category users (3 = 11.5%) shown in Figure 5.9. have complained about impolite staff behaviour, lack of cooperation from staff, few trained manpower, difficulty in getting staff in the office. Other users have said that when the person in charge of the search service was away, users were not attended to and that they were made to feel as though the service being offered was a personal favour.

5.2.4. Users' Suggested Solutions to identified Problems

User suggested solutions to the problems that were identified, were also grouped into three categories. The first category of solutions had to do with the improvement of the problems categorized under the **Document Delivery System** group and have been termed **Improve Delivery System**. Fourteen (51.8%) of the users indicated this solution. Included in this solution were the following: provide for end-user searching to avoid downloading irrelevant references, search results should be provided in print form; conduct user education on **CD-ROM** service, reduce delays, and seek new donors to resume document delivery.

The second category of suggested solutions had to do with hardware and were grouped under **More Hardware**. This was expressed in various ways such as improve equipment, install more **CD-ROM** drives, provide printing facilities, service should be available at each faculty library, link the service to faculties and departments, and establish a network. These solutions were suggested by 11 (40.7%) users as shown in Figure 5.10.

The suggested solutions affecting staff were given by five respondents and expressed as follows: increase manpower, assign committed staff, manpower expert in **CD-ROM** should

not be selective, and staff should focus on assisting rather than personal relations.

5.2.5. Benefits of CD-ROM Service to Users

As shown in Figure 5.8., 25 (92.6%) of the users expressed how they benefited from the **CD-ROM** Service. Although they had not been satisfied with particular requests, 10 users (i.e. 40%) felt that **CD-ROM** was generally good. For some it provided access to desired materials and references to locally available material which they did not know existed before and for others it was a rich source of current and rare articles.

Twenty percent (5) of the users stated that although the journals were not available, they found the abstracts very useful substitutes as they kept them updated on ongoing research and other scholarly activities within their area of interest. Only 6 (24%) of the users had had little benefit from the service in general and 4 (16%) indicated that they had not benefited at all.

Table 5.2. showed the different purposes to which information obtained from **CD-ROM** was put to use. Teaching and research, assignment and thesis writing featured highly with 14 frequencies each representing 60.9 % of the users, and other uses representing 17.4% of the usage.

5.2.6. Publicity of the CD-ROM Service

The majority of the surveyed users (17 =63%) came to know about the **CD-ROM** search facilities in the University through means other than the Library System's means of communication (i.e. through colleagues and lecturers) as shown in Figure 5.3. Fewer users (10 = 37%) learned about the **CD-ROM** search facilities through the

demonstrations, posters, addresses organized by the Library and surprisingly, none of the users mentioned the **CD-ROM** Newsletter.

As already was mentioned earlier, only 6 out of the 74 respondents who had never used **CD-ROM** indicated that they had seen the Newsletter entitled **CD-ROM @ Addis Ababa University** Libraries. The respondents suggested methods of increasing awareness among the potential users and these suggestions have been grouped into broad categories as shown in Figure 5.11. Thirty (40.5%) of the respondents suggested that **Orientation on the CD-ROM Service** be given to students when conducting the usual Library Orientation at the beginning of each academic year. New members of staff should also be given orientation about the service.

Appropriate notices were recommended by 15 (20.3%) of the respondents. This category embraced a whole range of suggestions as to where notices should be put up and how the notices should appear. Places suggested included notice boards in the various departments, and at library entrances. Notices and posters should be big and attractive so that they could be easily visible to all.

Twenty three(31.1.%) of the respondents suggested various means of **Dissemination of information about CD-ROM** such as producing a library guide on **CD-ROM**, organizing meetings, lectures, training sessions, distributing tracts and fliers and through lecturers and advisors in the departments. Only 4 (5.4%) of the respondents felt that the publicity done by the Libraries was enough and nothing more ought to be done, while 68 (91.9%) suggested the various methods described above.

Discussions with the Librarian and the afore-mentioned staff, however revealed that the newsletter was the most effective method of reaching a wider range of potential users. Strange enough, the results of the survey have proved to the contrary. It would appear that the other methods have not been as effective as the Libraries would like to believe. In the course of the interviews with staff, some pointed out that reading notices was not part of the country's culture, and could be a contributing factor to the claim of the majority of the respondents that they have not seen the posters and notices put up by the Libraries.

5.2.7. Appreciation for CD-ROM

Although only 26.7% of the surveyed sample have actually used **CD-ROM**, 73.3% of the sample as depicted in Figure 5.12., indicated that they would be in favour of cancelling subscriptions to journals in favour of **CD-ROM** databases. Since 98 of the respondents answered this question, assuming that all the 27 users were in favour of the idea, this means that 47 (63.5%) of the 74 respondents who have never used **CD-ROM** are prepared to sacrifice a few journals in order to maintain **CD-ROM**, on the basis of what was explained to them about the advantage of access to information rather than ownership of documents in the questionnaire.

An overwhelming majority - i.e. 86 out of the 94 who responded to the question expressed willingness to pay in order to have full documents to the references supplied as shown in Figure 5.13. This is an indication of how desperate information seekers are for current and relevant information. A few of the respondents indicated that their support was on condition that the shortage of current and relevant information would be reduced.

It should also be noted that the majority of the respondents (63.4%) are undergraduate students. These too have expressed their support for maintaining **CD-ROM** Service showing that they too are desperate for up-to-date information.

Tables 5.1. and 5.4. show the current utilization of **CD-ROM** databases and the **CD-ROM** databases potential users would like to utilize. There was more usage of titles in Information Science, Medicine, Education, and the Sciences, than titles in the Social Sciences. When it comes to the titles that potential users would like to utilize, the reverse is the case. Table 5.14. shows the highest number of **CD-ROM** titles desired to be in the Technology area, followed in decreasing order, by the Social Sciences, Sciences, General titles, Medicine and Education, and Information Science last.

5.3. SUMMARY OF THE ANALYSIS

The analysis of survey results has shown that the **CD-ROM** Service at AAULS is underutilized. The major reason identified is the lack of awareness on the part of potential users of the existence of the service and what databases exist in the various fields. Literature search results satisfy only a small percentage of the user population, leaving a larger percentage unsatisfied. The provision of full documents is not satisfactory in terms of fulfilling user requests and in terms of time lag. Fewer users are satisfied than not.

The weaknesses identified by the users include retrieval of irrelevant documents due to search through intermediaries, limit in the number of pages of documents for delivery, use of diskettes to download search results, insufficient education of users, insufficient search facilities and lack of the same in most faculties and staff problems. Users have suggested provision for end-user searching, providing search results in print form, conducting user-

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6.0. INTRODUCTION

This chapter presents the conclusion to the work and offers recommendations for the improvement of the **CD-ROM** Service provided by the AAULS.

6.1. CONCLUSION

This study has shown that for **CD-ROM** technology to be an effective tool in meeting the research and teaching needs of Addis Ababa University, a lot more needs to be done in terms of having more users whose demands are satisfied. It has been established from the study that only a small number (26.7%) of the potential users are actually utilizing the service. A major reason for the low number of users is the lack of awareness of the existence of the service.

The analysis has also shown that for this small number of users, not even half of them have had their needs fully satisfied. Users have complained about the time lag, retrieval of irrelevant references, lack of full documents, and insufficient knowledge about available facilities.

The issue of insufficient hardware has been confirmed even by the libraries (Addis Ababa University Libraries 1996). Users wish to have **CD-ROM** search facilities within their own faculties, especially for those not located on the Main Campus. They have also complained about the tying of the Service to individuals such that when they are not available, there is no one to attend to user requests.

This study has therefore, revealed that:

1. there are many potential users of **CD-ROM** who need to be made aware of it, thus showing the need to carry out intensive promotion of the service using the methods suggested by the potential users;
2. there is need for more **CD-ROM** facilities; at least all the campuses should be provided with such facilities.
3. there is need to educate the users about the benefits of **CD-ROM**, how they can make use of the bibliographic references obtained from the searches carried out, and the limitations of the service.
4. **CD-ROM** users and potential users appreciate the potential of **CD-ROM**, to effectively bridge the gap in information sources that the University has been experiencing since the late 1980s, to the extent that they are willing to meet part of the cost for the provision of the information.
5. even with the advent of the Internet, **CD-ROM** databases will prove to be the more reliable source of current information.
6. the University Libraries need to take measures aimed at saving time for the user.
7. the steps that have been taken by the Addis Ababa University Libraries administration (subscribing to some databases, plans to automate all libraries, with priority to networking **CD-ROM**) are just what users require.

The Addis Ababa University Library System is considered as a research and academic resource(AAU 1987, 181). Sadly, as it was shown in the report on the study of The Addis Ababa University Libraries which was undertaken in 1996, and already discussed in

chapter one of this theses, the University Library System has not fulfilled this role very well. The collection of books is outdated, copies are inadequate, and as was shown in Fig 1.1. there is a critical shortage of journals.

Although the University has taken measures to redress the situation, it will take a considerably long time to adequately stock the libraries with current books and journals. Even then, there is no way to make up for the gap in journal literature. It must be appreciated that no research or teaching of current relevance is possible without a reliable flow of current information and without access to archival and historical records(Berhanu and Levey 1996, 1).

The current trend in the Library and Information World, is placing emphasis on access to information rather than ownership of information sources. Addis Ababa University needs to make effective use of **CD-ROM** databases, which can give access to the world's journal articles in practically any field of research published within the past twelve months, at a reasonably low fee(Ephraim 1991).

To accomplish this, there needs to be a stated policy on information, recognizing information as a key resource for teaching and resource, and as such, requiring the formulation of plans, policies or guidelines to be implemented in relation to the use of available information resources and services(Montviloff 1990), including **CD-ROM**.

6.1.1. Lessons To Be Learned

It is clear that the telecommunications infrastructure in most African countries is inadequate to support cost-effective online access. The experience of some institutions in

African countries already connected to the Internet, such as University of Dar es Salaam (Masanja 1997) and now Addis Ababa, although yet in its early stage, also emphasize the point that **CD-ROM** is a more reliable tool for accessing current information in developing countries.

The ability of **CD-ROM** to operate under difficult conditions such as heat, humidity, dust, unstable power supply and the non-requirement of telecommunication networks are some of the advantages seen earlier on, which make it specially suitable to the African situation.

This study has provided a few lessons that can be applied to other African Universities and other institutions using **CD-ROM**. The first lesson is that periodic evaluation of the **CD-ROM** Service must be carried out in order to determine the extent to which it contributes to the fulfilment of the research and teaching needs of the institution. An information system or service exists for its users, and any true assessment of benefit must be firmly centred upon them (Bawden 1990, 146).

In the case of Addis Ababa University Libraries, the survey results have shown that the increase in the number of search requests and records downloaded from the databases which has been registered, especially for the year 1996, is not sufficient indication of how well the service is doing. Other African Universities should examine their situation and investigate how effective their service is in meeting user needs in terms of usefulness of the bibliographic records given to the users.

In comparison to the total user population, how many are actually utilizing the service, and are having their information needs met? If not what are the reasons? Do all potential

users know the benefits of **CD-ROM** and what they need to do in order to benefit from the service? These are the issues that other institutions on the continent should address. Further more, much of Africa is not a reading public and notices and posters will not have significant impact as far as publicizing **CD-ROM** is concerned, as it has been proved by the experience of Addis Ababa University. Therefore, other means of dissemination of information in keeping with the African culture, which is basically an oral and curious society, can be employed in addition to the notices and posters.

Other African Universities can also take a leaf from the steps taken by the Addis Ababa University Libraries administration. The administration has made efforts to source funds for the continuation of subscriptions to at least the most frequently utilized **CD-ROM** databases.

6.2. RECOMMENDATIONS

In order to make the **CD-ROM** Service in the Addis Ababa University Library System effective, the following recommendations should be taken on:

(1) The Libraries should devise a *systematic, consistent User Education Programme* to be conducted throughout the Academic Year. All newly registered members should be given orientation of **CD-ROM** as part of the general Library orientation programme conducted at the beginning of the academic year. Such programmes should be arranged in conjunction with the faculties and in addition to the demonstrations, should include explanation to the users of what **CD-ROM** is, its importance in providing relatively current information, how they can benefit from it and when it should be used. Users should also be trained on how to conduct their own searches after more equipment has been acquired.

(2) With the availability of the portable **CD-ROM** reader, the Libraries should make intensive efforts to carry out demonstrations in all faculties. For demonstrations to be effective, they too should be conducted on an ongoing basis, not just once or twice a year.

The Libraries, for instance, can make a demonstration schedule on a particular day of the week at a convenient time and conduct demonstrations consistently at the scheduled times.

(3) Considering that there are not enough trained personnel for **CD-ROM** information retrieval, training more staff should be given priority so that users can be attended to at all times without having to depend on particular individuals. This should be a short term measure before end user searching is introduced.

(4) The Libraries should consider placing **CD-ROM** workstations where they can be seen and easily accessed by all library users instead of putting them in the basement or some office as is the current practice in the Addis Ababa University Library System. The Reference Department, for instance, is an ideal location since most library users go there with queries on various information needs. The member of staff conducting literature search can use the opportunity to explain to the users about the scheduled demonstrations and have users book for the next available session. This can create more publicity as users will be curious about what is going on by the mere appearance of the computer in the area. Users can even be involved in the demonstrations in order to cover a larger population of potential users.

(5) The Addis Ababa University authorities should enact a policy on information to govern the use of available information resources and services, including the effective and appropriate use of **CD-ROM** databases. Such a policy should

take into account the fact that provision of information, especially current information, is not cheap and hence the concept of providing free information must be reconsidered. Even library users appreciate that quality is not free or cheap and have therefore, recognized the need to contribute to access of current information as shown by this study.

(6) The AAULS should go ahead with their plans to network CD-ROM. Depending on availability of funds Campus Local Area Network and even Wide Area Network linking all the branch libraries to the Central Library should be given serious consideration. If this is done, users will be able to access any CD-ROM database of their choice with no need to travel to another campus in order to do so.

Most of the above recommendations involve some kind of expenditure and may take some time to plan and implement. The final recommendation does not involve any expense in terms of money, but only requires time and commitment on the part of the staff. In order to save a little time for the user, I recommend that:

(7) The Libraries, especially the Central Library which presently serves **CD-ROM** users from other campuses, create and maintain a database of articles that have been provided through the document delivery system. when users submit their requests, the database can be searched right away to check if there are articles previously ordered relevant to the request. If there are, the requester can be directed to the Periodicals' Library right away, with the title of the article(s) and the document number. In the case of the Medical Library, the article can be retrieved then and their using the document number.

This will save the users the trouble of first waiting for a day or two before getting the results from the literature search, then going to look for a computer to browse through the search output, selecting the items for ordering, going to the Library Computer Centre to fill in the document delivery request form, and then waiting for feedback.

The recommended database can be created using the **Micro CDS/ISIS** software in consultation with any of the available bibliographic formats, such as the **Marc (Machine Readable Cataloguing)** format, the **Padis (Pan African Development Information Systems)** format, **ABNCD+** (Abebe, Bamuhiiga, Neelameghan, Chisenga, and Carolyn, Dorothy), **MIBIS (Microcomputer-Based Bibliographic Information Systems)** and the **CCF (Common Communication Format)**. The Central and Medical Libraries both have competent personnel who can create the databases. Table 6.1 shows an example of database definition using the **Micro CDS/ISIS** software and employing field tags from the **ABNCD** format.

Table 6.1 Field definition table in CDS/ISIS

Field Definition Table (FDT)

DATA BASE:NAOMY

Field tag	Name	Len	Typ	Rep	Delimiters/Pattern
100	Title	200	X		
110	Personal Author(s)	200	X	R	abc
200	Journal Title	300	X		abcd
121	Publisher	100	X		
120	Edition	30	X		
201	ISSN	20	X		
160	ISBN	20	X		
320	Key Words	200	X		
123	Date of Publication	20	N		
310	Abstract	500	X		
411	Call Number	50	X		
410	Location	100	X		
111	Corporate author(s)	200	X		

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APPENDIX I

Table of Random Numbers used in Sampling.

Appendix 5

Table of Random Numbers

10097	85017	84532	13618	23157	86952	02438	76520	91499	38631	79430	62421	97959	67422	69992	68479
37542	16719	82789	69041	05545	44109	05403	64894	80336	49172	16332	44670	35089	17691	89243	26940
08422	65842	27672	82186	14871	22115	86529	19645	44104	89232	57327	34679	62235	79655	81336	85157
99019	76875	20634	39187	38976	94324	43204	09376	12550	02844	15026	32439	58537	48274	81330	11100
12807	93640	39160	41453	97312	41548	93137	80157	63606	40387	65406	37920	08709	60623	2237	16505
66065	99478	70086	71265	11742	18226	29004	34072	61196	80240	44177	51171	08723	39323	05798	26457
31060	65119	26486	47353	43361	99436	42753	45571	15474	44910	99321	72173	56239	04595	10836	95270
85269	70322	21592	48233	93806	32584	21828	02051	94557	33663	86347	00926	44915	34823	51770	67897
63573	58133	41278	11697	49540	61777	67954	05325	42481	86430	19102	37420	41976	76559	24358	97344
73796	44655	81255	31133	36768	60452	38537	03529	23523	31379	68588	81675	15694	43438	36879	73208
98520	02295	13487	98662	07092	44673	61303	14905	04493	98086	32533	17767	14523	52494	24826	75246
11805	85035	54881	35587	43310	48897	48493	39808	00549	33185	04805	05431	94598	97654	16232	64051
83452	01197	86935	28021	61570	23350	65710	06288	35963	80951	68953	99634	81949	15307	00406	26898
88685	97907	19078	40646	31352	48625	44369	86507	59808	79752	02529	40200	73742	08391	49140	45427
99594	63268	96905	28797	57048	46359	74294	87517	46058	18633	99970	67348	49329	95236	32537	01390
65481	52841	59684	67411	09243	56092	84369	17468	32179	74029	74717	17674	90446	00597	45240	87379
80124	53722	71399	10916	07959	21225	13018	17727	69234	54178	10805	35635	45266	61406	41941	20117
74350	11434	51908	62171	93732	26958	02400	77402	19565	11664	77602	99817	28573	41430	96382	01758
69916	62375	99292	21177	72721	66995	07289	66252	45155	48324	32135	26803	16213	14938	71961	19476
09893	28337	20923	87929	61020	62841	31374	14225	94864	69074	45753	20505	78317	31994	98145	36168

Source: Schaum's outline of theory and problems of business statistics. by Leonard J. Kazmier, 1976 page 364.

APPENDIX II

Questionnaire that was used to conduct the survey

SURVEY OF USERS' APPRAISAL OF THE **CD-ROM** FACILITIES AT ADDIS ABABA UNIVERSITY LIBRARIES

Questionnaire

INTRODUCTION

I am a graduate student of the School of Information Studies for Africa(SISA), at Addis Ababa University, Ethiopia, carrying out a research on **CD-ROM** databases as information sources for African researchers:a case study of Addis Ababa University. (**CD-ROM** stands for Compact Disc Read Only Memory. A **CD-ROM** is similar to a musical CD, but the difference is that you need a computer **CD-ROM** drive in order to read from the disc). This study is a requirement for the successful completion of the Master of Science in Information Science Degree Program. Your answering this questionnaire will help determine the usefulness of **CD-ROM** databases in meeting the teaching and research needs of Addis Ababa University, thus providing a basis for policy formulation vis a vis **CD-ROM** sustainability issues. You will also assist me in successfully preparing my thesis, an important requirement for the award of the Degree of Master of Science in Information Science. For most of the questions you *ONLY* need to *TICK* on the provided space. For other questions feel free to use extra paper if the space provided is not adequate.

USE THE ENCLOSED ENVELOPE TO MAIL YOUR COMPLETED QUESTIONNAIRE

Thanking you in anticipation of your Assistance,

Naomy Mtanga

SISA Graduate Student

SECTION I. PERSONAL DATA

PLEASE INDICATE YOUR ANSWER BY TICKING ON THE SPACE PROVIDED

1. Sex: ☐ (a) Male
☐ (b) Female
2. Status:
☐ (a) Undergraduate student
☐ (b) Postgraduate student
☐ (c) Faculty/Teaching staff
☐ (d) Administrative staff
☐ (e) Other (please state)

3. If you ticked (c) in 2. please indicate your rank or qualification(s) by ticking one or more of the following.
☐ (a) lecturer
☐ (b) Senior lecturer
☐ (c) Associate/Assistant Professor
☐ (d) Full Professor
☐ (g) Other (please specify)

4. Faculty /Department (please tick what is applicable)
☐ (a) SISA
☐ (b) LAW
☐ (c) FBE
☐ (d) LANGUAGE STUDIES
☐ (e) SOCIAL SCIENCES
☐ (f) SCIENCE
☐ (g) MEDICINE
☐ (h) TECHNOLOGY
☐ (i) EDUCATION

SECTION II. USE OF CD-ROM SEARCH FACILITY

INSTRUCTIONS: Answer by TICKING from the available options.

5. Listed below are titles of **CD-ROM** databases available in the Addis Ababa University Libraries System. They are grouped under the relevant faculty. TICK ALL the titles you have used. *IF YOU HAVE NOT USED THE CD-ROM SEARCH FACILITY SKIP AND GO TO SECTION III.*

(i) MEDICINE

- _____ (a) Medline
- _____ (b) Electronic library of medicine
- _____ (c) Renal tumors of children
- _____ (d) Family Physician
- _____ (e) Pediatrics review and education
program/red book
- _____ (f) Pediatrics
- _____ (g) The pediatric infectious disease journal
- _____ (h) Cancer: a journal of the American Cancer Society
- _____ (i) EMBASE CD: obstetrics and gynaecology
- (j) Family health book
- _____ (k) Primary care library
- _____ (l) POPLINE
- _____ (m) 1989 Yearbooks
- _____ (n) The New England Journal of Medicine

(ii) BUSINESS AND SOCIAL SCIENCES

- _____ (a) PAIS (Public Affairs Information Service)
- _____ (b) PSYCLIT (Psychology)
- _____ (c) Social Sciences Citation Index
- _____ (d) DAI **CD-ROM** (Development Activity
Information)
- _____ (e) Social Science Index
- _____ (f) Social Science Source
- _____ (g) NTIS bibliographic database

(iii) EDUCATION

_____ (a) ERIC

(iv) SCIENCE AND TECHNOLOGY

_____ (a) Life science collection

_____ (b) Earth science disc

_____ (c) GeoRef

_____ (d) Science Citation Index

_____ (e) MathSci Disc

_____ (f) Earth Disc

_____ (g) Applied science and technology Index

_____ (h) Compendex plus (Engineering)

_____ (i) Ei Page One (Engineering)

_____ (j) INIS (International Nuclear Information System)

(v) INFORMATION SCIENCE

_____ (a) LISA (Library and Information Science)

_____ (b) Complete Encyclopedia of Networking

_____ (c) Silver Platter Software Resource CD

_____ (d) Integrated Technical Services Workstation
Demonstration

(vi) GENERAL

_____ (a) World Magazine Bank

_____ (b) Global Books In Print

_____ (c) A Window on Korea

_____ (d) REFWORLD Demonstration Version

_____ (e) Springer In Print

_____ (f) Baker and Taylor Books

_____ (g) Complete Catalogue of Books Journals & Software

_____ (h) Higher Education Information System

_____ (i) UNBIS PLUS on **CD-ROM**

_____ (j) Current Citation

6. If you do not know the title of the **CD-ROM** database(s) you have used indicate the subject(s) or key words of the search(es) carried out on the space provided below.

7. How did you know about the **CD-ROM** search facility at Addis Ababa University?(Please tick one of the options below)

- ☐ (a) Poster on Library notice board
- ☐ (b) Poster around campus
- ☐ (c) **CD-ROM** newsletter
- ☐ (d) **CD-ROM** demonstration
- ☐ (e) Workshop/Seminar on **CD-ROM**
- ☐ (f) informed by lecturer
- ☐ (g) Address by library staff
- ☐ (h) Through a colleague
- ☐ (i) Other (Please specify)

8. Was this your first time to learn about **CD-ROM** as an information source?(please tick what is applicable)

- ☐ (a) YES
- ☐ (b) NO

If you answered Yes, go to Q.10. If your answer is NO, proceed to Q.9.

9. Where had you used/heard of **CD-ROM** before? (please tick where applicable)

- ☐ (i) While studying/working abroad
- ☐ (ii) Read about it from a journal/book
- ☐ (iii) Received a demonstration disc from
CD-ROM producer
- ☐ (iv) Heard about it from a colleague
- ☐ (v) Other (Please indicate below)

10. How often do you use the **CD-ROM** search service on average? (Indicate by ticking

one of the options below)

- _____ (i) Everyday
- _____ (ii) At least once a week
- _____ (iii) Once in two weeks
- _____ (iv) At least once a month
- _____ (v) Less than five times a year

11. To what extent have you had satisfactory results to your search or search requests?
(Tick one of the following:)

- _____ (i) 75 % to 100% of the time
- _____ (ii) 50% to 74 % of the time
- _____ (iii) 25 to 49% of the time
- _____ (iv) Below 25 % of the time
- _____ (v) None at all

12. If you ticked (v) in 11 above, what are your reasons for your answer? (Tick what is applicable)

- _____ (i) was given a long list of journals and book titles instead of the information I wanted and this was frustrating.
- _____ (ii) Although the titles given on the floppy diskettes were relevant to my information needs, I did not know how and where to find the full documents/articles, thus I did not use the references I got.

_____ (iii) Any other reason (Indicate below)

13. If you have requested for photocopies of the articles selected from the databases, how many of these have you actually received? (Tick one of the following:)

- _____ (i) More than 75 %
- _____ (ii) More than 60 %

- _____ (iii) At least 50 %
- _____ (iv) Between 25 and 50%
- _____ (v) Below 25 %
- _____ (vi) None at all

14. Would you say the articles arrived in time to serve the purpose for which you requested them? (Tick one of the following:)

- _____ (i) Every time
- _____ (ii) Three quarters of the time
- _____ (iii) About half the time
- _____ (iv) Twenty per cent of the time
- _____ (v) Never

15. How have you made use of the information acquired from the **CD-ROM** databases? (Tick what is applicable below)

- _____ (i) For teaching purposes
- _____ (ii) Assignment/term paper
- _____ (iii) Research purposes
- _____ (iv) In thesis preparation
- _____ (v) In dealing with clinical cases
- _____ (vi) Any other (Please state)

16. How have you personally benefitted from **CD-ROM** service?

17. In your view, what are the weaknesses of the **CD-ROM** service offered by Addis Ababa University Libraries?

18. What steps should be taken in order to improve the service?

GO TO SECTION IV

SECTION III. **CD-ROM** NON-USE,

19. What is/are your reason(s) for not using any of the **CD-ROM** databases listed in question 5? (Tick your answer from the following:)

- _____ (a) Do not know what **CD-ROM** is.
_____ (b) Do not know of existence of the service.
_____ (c) Do not know there are databases relevant to my area of interest.
_____ (d) I do not go to the library
_____ (e) Other reason (Please state below)

20. Are there any **CD-ROM** titles listed in question 5 which you would like to use?

- _____ (a) Yes
_____ (b) No

If you answered Yes indicate the titles below:

21. Addis Ababa University Libraries produce a newsletter entitled **CD-ROM @ AAU** Libraries on a quarterly basis. Have you ever read or seen it? Tick one of the following:

- _____ (a) Yes
_____ (b) No

22. The Libraries have also put up posters and notices and also carried out demonstrations on how to use **CD-ROM**. If you have not seen or heard about these, what do you think the libraries ought to do in order to make everyone aware of the service?

SECTION IV. SUPPORT FOR **CD-ROM** SERVICE. *Before answering the questions below, NOTE: (i) Journal subscription is expensive and the library is unable to subscribe to all necessary titles.*

(ii) **CD-ROM** service can provide access to unlimited numbers of journals that the library can never afford to subscribe to. You can request for photocopies of any article you require from the **CD-ROM** database.

23. If the University were to cancel subscriptions to some journals in order to pay for **CD-ROM** databases, would you support the move? (Tick one of the following:)

- ☐ (i) Strongly support
- ☐ (ii) Support
- ☐ (iii) Oppose the idea
- ☐ (iv) Strongly oppose

24. If you are required to pay a minimal amount of Birr for the delivery of the photocopy of articles you select from the **CD-ROM** databases, would you be willing to do so? (Tick one)

- ☐ (a) Very willing
- ☐ (b) Willing
- ☐ (c) Unwilling
- ☐ (d) Very Unwilling

THANK YOU FOR YOUR COOPERATION!

APPENDIX III

Interview Guide on the **CD-ROM** Search Service
in Addis Ababa University Libraries
held with Campus Librarians and Persons in charge of
CD-ROM Search Facilities

DATE:

1. For how long has **CD-ROM** search service been conducted in your centre?

2. Prior to introducing **CD-ROM** to the university, was there any study carried out to find out the potential usage of the technology?

3. Had there been any efforts to promote **CD-ROM** service before the AAAS Pilot Project?

4. The newsletter entitled **CD-ROM @ AAU**, how widely is it distributed and how satisfactory has it been in publicizing the service?

5. AAAS year two report stated that there was need to increase the user base. What steps has the library taken to ensure an increased number of users.

6. The end of year Pilot Project progress report for 1996 stated that the had been an

increase in the volume of use. Do user statistics indicate any increase in the number of users?

7. In most of the cases, you conduct searches for the end users, does this not put too much pressure on you or do you manage to cope with all the requests coming from the users?

8. AAUL is now connected to the Internet. Do you still feel there is need to continue with the **CD-ROM** search service or do you see Internet services replacing **CD-ROM**?

9. The Pilot Project progress report for 1996 has indicated that the library has budgeted for 15 **CD-ROM** titles for subscriptions to be continued from next academic year. Which are the titles and how many fall under your centre?

10. Do you feel the use made of these databases justifies the amount of money paid in subscription?

11. The **CD-ROM** search facility in the library system is only available to post-graduate students and faculty. Why have not the undergraduates not been exposed to the service?

APPENDIX IV

Interview Guide on the **CD-ROM** Facilities at Addis Ababa University

held with the University Librarian

DATE: 2nd May 1996

1. According to some sources contacted during the preliminary study, **CD-ROM** databases were introduced to AAU in the late 1980s. Could you confirm this?

2. When was the search facility introduced to the end users?

3. Was there any official launching of the **CD-ROM** search service?
If not, how did users come to be aware of the service?

4. Prior to introducing **CD-ROM** to the university, was there any study carried out to find out the potential usage of the technology?

5. Had there been any efforts to promote **CD-ROM** service before the AAAS Pilot Project?

6. The newsletter entitled **CD-ROM @ AAU**, how widely is it distributed and how

satisfactory has it been in publicizing the service?

7. AAAS year two report stated that there was need to increase the user base. What steps has the library taken to ensure an increased number of users.

8. The search service is characterized by library staff conducting the searches, does this not put too much pressure on the library staff and is there a possibility of having end users do the searches in the near future?

9. The **CD-ROM** search facility in the library system is only available to post-graduate students and faculty. Why have the undergraduates not been exposed to the service?

10. AAUL is now connected to the Internet, what effect is this likely to have on the **CD-ROM** service?

11. How soon does the library intend to extend Internet services to the end-users.

12. I understand that plans to computerize the entire library system are underway. Do these include plans to network **CD-ROM**?
-
-
13. The **CD-ROM** Pilot Project Year-end Progress Report for 1996 shows that subscription to 15 databases has been budgeted for the coming academic year. Is this to be a long term commitment to continue from year to year or just for this moment?
-
-
14. The report also states that the library has used some fund from SAREC to subscribe to more databases. What is going to happen to these databases once the donor support is withdrawn?
-
-
15. Is the current usage made of **CD-ROM** worth the cost of subscription?
-
-
16. Does Addis Ababa University have a policy on information? If not, do you not feel such a policy, and including a specific one on **CD-ROM** would help in dealing with maintenance and sustainability issues concerning the service?

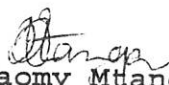
APPENDIX V

Names of persons who were interviewed and those with whom informal discussions were held.

1. Dr Taye Tadesse University Librarian
2. Ato Tadesse Kalbessa Medical Librarian
3. Ato Kebede Hundie In charge of **CD-ROM** Centre at Medical
Library
4. Ato Azene Zenebe In charge of **CD-ROM** Centre at Kennedy
Library
5. Ato Negussie Tadesse CD-ROM Literature Search Personnel at
Kennedy Library
6. Ato Getachew Birru Dean of SISA

DECLARATION

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


Naomy Mtanga

May, 1997

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


G.A. Alabi (Dr)

May, 1997