A SURVEY OF COMPACT DISC-READ ONLY MEMORY (CD-ROM) TECHNOLOGY APPLICATION IN SOUTH AFRICAN UNIVERSITY LIBRARIES

by

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Declaration

This thesis is the original work of the researcher and has not been submitted in any form to another university. Where use was made of the works of others, this has been duly acknowledged in the text and included in the Bibliography.

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Abstract

This study surveyed Compact Disc-Read Only Memory (CD-ROM) technology in South African university libraries. The survey instrument used to elicit data was a questionnaire which was distributed via electronic mail (e-mail). CD-ROMs have been in the marketplace for over a decade and the extent to which South African university libraries have embraced CD-ROM technology was surveyed. Libraries offer CD-ROM services to internal staff and end-users, who in this study were students and academic staff. The study highlighted some of the CD-ROM related management issues such as budgeting, networking, resource sharing and end-user training.

Survey results from the respondents indicated that they had all adopted CD-ROM technology. However, the level of CD-ROM technology and services in Historically White Institutions (HWI) and Historically Black Institutions (HBI) differed. This was evident in areas such as the year in which CD-ROMs were acquired, collection sizes and network access. The results showed that all libraries offered some form of end-user training to academic staff and students. The evolving nature of CD-ROM technology presents a great challenge for libraries trying to keep up-to-date with the technology. This was highlighted in the open-ended questions about CD-ROM development plans and comments in general about CD-ROM technology in the different libraries. All libraries had access to the Internet and were working towards providing electronic information resources via the Web. Resource sharing and the establishment of consortiums can address the exorbitant costs of providing electronic information resources.

Recommendations for further research on different aspects of CD-ROM technology were made. The development of the Internet as an information delivery system for the distribution of on-line information will emphasize the extent to which librarians and end-users are using the Internet for on-line information, as compared with CD-ROM services. Increasingly, aggregators are publishing information on the Internet and South African university libraries are already seeing this as an alternative to maintaining CD-ROM technology and services.

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Abbreviations

AAAS	American Association for the Advancement of Science
CAI	Computer-Aided Instruction
CALICO	Cape Library Consortium
CBT	Computer-Based Training
CD-I	Compact Disc Interactive
CD-ROM	Compact Disc-Read Only Memory
CMC	Computer-Mediated Communication
DVD	Digital Versatile (or Video) Disc
DVD-RAM	Digital Versatile (or Video) Disc Random Access Memory
DVD-ROM	Digital Versatile (or Video) Disc Read Only Memory
ELSA	Electronic Reference Library for Southern Africa
E-Mail	Electronic Mail
FRELICO	Free State Libraries and Information Consortium
ESAL	Eastern Seaboard Association of Libraries
GAELIC	Gauteng and Environs Library Consortium
GB	Gigabyte
HBI	Historically Black Institutions
HWI	Historically White Institutions
ICT	Information Communication Technology
IT	Information Technology
IVR	Interactive Voice Response
LAN	Local Area Network
MPEG	Moving Picture Experts Group
UOFS	University of the Orange Free State
OPAC	On-line Public Access Catalogue
PALINET	Pennsylvania Area Library Network
PC	Personal Computer
PUCHE	Potchefstroom University for Christian Higher Education

RAU	Rand Afrikaans University
Rhodes	Rhodes University
SABINET	South African Bibliographic Information Network
SEALS	South East Academic Library System
TDE	Touch-Tone Data Entry
UDW	University of Durban-Westville
UFH	University of Fort Hare
UND	University of Natal, Durban
UNISA	University of South Africa
UNITRA	University of Transkei
UNP	University of Natal, Pietermaritzburg
UWC	University of Western Cape
VCD	Video Compact Disc
WAN	Wide Area Network
WGLIT	Working Group on Libraries and Information Technology
WITS	University of the Witwatersrand

Chapter One

Introduction

1   Background

Both *Librarianship and Information Work Worldwide, 1999* (1999) and the *World Communication and Information Report, 1999-2000* (1999), acknowledge a paradigm shift in the information milieu. Advances in micro-computing and telecommunications have seen the growth of the Internet and Information Communication Technology (ICT) applications. Seshagri (1999: 133) notes:

> "The drive towards globalisation of ICT which involves computer hardware and software, radio and television receivers, broadcasting and telecommunications equipment and networking and multimedia systems has created new technologies, products and services. The years 1997 and 1998 saw an unprecedented number of such innovations."

Libraries, too, as noted by Meadows (1999: 1), are making "the transition from traditional communication channels to digital channels." The common denominator in this convergence is information – storage, retrieval and dissemination. One such ICT application is that of Compact Disc-Read Only Memory (CD-ROM) technology, the proliferation of which in libraries worldwide transformed library and information work, as is evident in the vast literature published. Research by Winkworth and Shields (1999: 52) cautions that

> "the role of CD-ROMs in the digital age continues to be debated, with some experts still of the opinion that they will eventually be made redundant by Internet technology. Others argue that CD-ROMs will continue to play an essential role in libraries, particularly in view of recent advances in their technology."

South Africa is no exception to the emerging ICT market, where academic libraries began embracing CD-ROM technology in the early 1990s. Darch and Underwood (1999) discuss ICT challenges in South African academic libraries and acknowledge the acceptance of Information Technology (IT), but in the context of the post-apartheid environment.

Academic libraries worldwide have been proactive in acquiring CD-ROM technology for their internal staff use and as a service to the wider academic community, with concomitant impact on services and work processes.

1.1   Problem Statement

Adopting CD-ROM technology is an expensive undertaking and commitment by libraries, especially with the constant development of CD-ROM products (Hanson and Day, 1994). Lancaster and Sandmore (1997) noted that CD-ROM technology has become pervasive in academic libraries and that it affects staff, users and services. Some of the major issues which Lancaster and Sandmore (1997: 117-127) raised that are of relevance to this study were:

- All staff are expected to learn how to use CD-ROM technology, especially when staff are expected to offer Reference and Information Services.

- CD-ROM technology has affected the policies and services of libraries in areas such as collection and usage of print indexes and abstracts. This impacts on resource-sharing such as document delivery and inter-library loan services.

- Library staff have increased involvement in bibliographic instruction and electronic resources.

- Some libraries have absorbed the costs of adding CD-ROM databases, at the expense of other types of materials. However, some libraries have found creative approaches to cost recovery, or partial cost recovery in the case of fee-based services.

- CD-ROM technology could improve the economics of collection management in some libraries where a "just in time", as opposed to a "just in case", approach to journal subscription is adopted.

- Accessibility of CD-ROM services has expanded from stand-alone workstations to local area networks (LANs) and beyond.

Kanamugire (1997: 133) states that there are many challenges facing developing countries in planning, implementing and managing CD-ROM services. Issues such as funding, hardware, software, database selection, installation, staff and user training,

publicity, use policies, document non-availability and evaluation need to be carefully thought of in order to provide such a service. He notes further that

> "the implementation of CD-ROM in developing countries will continue growing and that users will increasingly become more sophisticated and will keep demanding better CD-ROM resources and services. In order to cope with these demands, institutions involved in implementing CD-ROM services will continue pursuing the current trend of adopting resourceful, creative and innovative approaches in tackling the challenges posed by the implementation of CD-ROM."

Bearing the above issues in mind, and despite CD-ROM technology having been in the marketplace for over a decade, few studies have been done in the South African context relating to CD-ROM technology's use or application in academic libraries and university libraries in particular. The studies that do exist in the literature comprise case studies of specific institutions and these are documented by Geldenhuys (1995), Snyman (1995), Wilcocks (1996, 1993), and Lees (1995). Given their nature, these studies do not provide an overall view of CD-ROM technology in university libraries in South Africa.

Darch and Underwood (1999: 288) noted the classification of South African academic institutions in the apartheid era as Historically White Institutions (HWI) and Historically Black Institutions (HBI), where the former served the White population and the latter served the Black population. The Working Group on Libraries and Information Technology (WGLIT) Report (1996) undertook a study of IT and library resources in these institutions. It was found that:

> A typical HWI had a stock of 507 000 titles and 684 000 volumes; subscribed to 7 000 periodical titles and 200 CD-ROMS with 67 subscriptions to current CD-ROM titles. There was library automation with 200 linked PC terminals. The system had access to SABINET. The information technology (IT) centre was a separate unit from the main library. IT facilities were well developed. An extensive home page was maintained on the Internet and 22 local schools were linked to the Internet via the university. The computer/IT budget was 3.4% of the total budget. About 75% of academic staff had PCs on their desks, while 68% of the undergraduates and 100% of the postgraduates had access to the university's network. There were 11 PC laboratories (728 PCs) for subject specific and general educational use.

On the other hand, the library in a typical HBI had

> a stock of 154 000 books. It had 2 700 periodical titles, with gaps in science and management studies. The periodical collection was supplemented by 44 CD-ROM databases. Its Inter-Library Loan transactions statistics indicated that it is a net borrower (95%) rather than a lender (5%). The library had an automated system and had 58 PCs and terminals linked to the system. It had access to SABINET. There was a poor PC network which only recently enabled some staff to access e-mail from their PCs. The IT infrastructure was not well developed with very few students having network access. As a result there was no technical support for the library by the IT centre. (WGLIT, 1996)

The present study takes into consideration the distinction between HWI and HBI. A review of CD-ROM technology and the various issues relating to it in all university libraries (including HWI and HBI) in South Africa does not exist. It is this problem that the present research attempts to address.

1.2 Aim of the Study

Given the above problem, the aim of the study was to determine the status of CD-ROM technology in university libraries in South Africa, with regards to subscriptions and collections, budgets, access and end-user training and other management issues relating to CD-ROM services.

1.3 Objectives of the Study

The objectives of the study were as follows:

- To determine the extent to which South African university libraries have embraced CD-ROMs.
- To determine the level of access to CD-ROMs by students and academic staff.
- To gain insight into management issues such as budgeting, networking and end-user training.
- To determine the extent to which issues such as resource sharing, statistical records and future developments are being addressed by the different institutions.
- To make recommendations for libraries and anyone wanting access to information on CD-ROM technology in South African university libraries.

1.4   Significance of the Study

Libraries embrace technology for different reasons. Lancaster and Sandmore
(1997: 1) list some of the possible reasons why IT is applied to library processes as:

- To cope with increasing demands.
- To reduce staff and prevent staff increases.
- To allow more activities to be performed by clerical and para-professional staff.
- To improve existing services.
- To provide new services.
- To collect better data to aid overall management of the library.

The extent to which South African academic libraries have considered the process of
IT adoption or have embraced IT is important, especially with the rapid development
in ICT. This can be seen in the services academic libraries provide and offer. The
WGLIT Report (1996) surveyed all academic libraries in South Africa. It was found
that there was a presence of automated library systems but there was a clear disparity
between HWI and HBI. Adoption of IT applications is a continuous process. It
impacts on resources, both human and financial. From the reviewed literature
available it was seen that no other study on CD-ROM technology in all South African
university libraries had previously been undertaken.

CD-ROM is part of an electronic information service. Biddiscombe (1996: 1) notes
that with electronic information resources, libraries

> "are being forced to change because increasing numbers of users are no longer
> solely dependent on a static storehouse to satisfy their information needs. Nor
> do they rely on the intermediary skills of a librarian to answer an enquiry or
> search for information. New services are consequently being demanded of
> libraries, and new skills are expected from the staff within them."

In South Africa too, Van Brakel (1991a) highlighted the emergence of the "electronic
workstation" which allows the end-user access to a range of electronic information
resources.

The extent to which university libraries offer networked CD-ROM services coupled
with end-user access and training is significant as these are on-going processes that

need to be planned. This topic has not been explored in the literature and is one which is examined in the present study.

The application of IT and electronic information products in South African academic libraries is noted by Darch and Underwood (1999: 289). They highlighted that in order to purchase electronic information resources, academic libraries in South Africa, which are still very print-based, need to form consortiums like those in the United States of America. This study explores the topic of CD-ROM resource sharing. Resource sharing as it relates to CD-ROM technology in South African university libraries is another subject which is not covered in the literature. It is examined in the present study, which emphasizes the different levels of CD-ROM technology and services in particular libraries. It is feasible that libraries with a more comprehensive range of CD-ROM services can act as "resource" libraries for others wanting to develop their CD-ROM services.

The findings of the present study can be used by anyone wanting to gain an overview of the status of CD-ROM technology in South African university libraries, especially in the age of the Internet, where many libraries are starting to employ the Internet as an alternative source of information.

1.5 Definition of Terms

1.5.1 Library

For the purpose of this study the term "library" refers to either the university library or the academic library. The university library refers to the main library situated on the main campus of the university. The university library in this study is one which serves both the general student population and academic staff.

1.5.2 CD-ROM Technology

Reference to CD-ROM technology in the present study is made in a generic context and includes hardware such as a CD-ROM drive, software and peripherals such as printers which are attached to the computer. Technical issues such as network types and configuration is not included as part of CD-ROM technology.

1.5.3 University

The *Collins Paperback English Dictionary* (1998: 914) defines a university as "an institution of higher education with authority to award degrees; the buildings, members, staff, or campus of a university." The university population in the present study refers to registered students and academic staff employed by the university. In this study the word "university" is used interchangeably with "institutions", unless otherwise stipulated.

1.5.4 End-User

An "end-user" refers to members of the university community making use of the library's services and facilities. An end-user could be students, academic staff or other administrative staff employed by the institution.

1.5.5 Access

Access in the context of this study refers to the ability of students and academic staff to make use of the CD-ROM service. Access to the CD-ROM service can be done either physically via a workstation in the library or remotely via CD-ROM services made available over the network. The different forms of access are highlighted in context and where appropriate.

1.6 Limitations of the Study

- The study confined itself to a survey of all the university libraries in South Africa. Technikons and other post-secondary academic institutions, such as teacher training colleges, have been excluded. Findings are therefore not applicable to academic libraries in South Africa in general.

- The survey instrument was distributed to main libraries on the main campus of the different universities. Separate branch libraries or departmental libraries located on the main campuses were not sent questionnaires. Regional libraries of multi-site campuses such as VISTA and UNISA were not sent individual questionnaires too. The researcher acknowledges that these libraries may have CD-ROM technology and CD-ROM collections which is not reflected in this study. However, the question on titles of CD-ROMs subscribed to by the

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different libraries could include those titles in the branch or departmental libraries.

- For this study, the University of Natal, Durban and Pietermaritzburg campuses were surveyed as separate universities. This was done based on the listing of university libraries provided by the researcher's supervisor and the listing of other South African university libraries found on Rhodes University Library website.

- The questionnaire was distributed via electronic mail (e-mail). The questionnaire was sent to e-mail addresses of individuals found on the Internet websites of the respective libraries. This could have resulted in the questionnaire going to a person who was unable to complete the questionnaire or act expeditiously on it. In the event of this occurring it was assumed that the e-mail would have been passed on to a person who could respond to the questions posed. This, however, might not have occurred. (Chapter Four covers a more in-depth discussion of some of the limitations of e-mail as a distribution mechanism and the problems experienced by the researcher.)

- The questionnaire required respondents to provide statistical information in areas such as periodical subscriptions, budgets and usage. Libraries may not have had records of such information and the researcher anticipated that some respondents might have been unable to complete these questions.

- CD-ROM titles referred to individual subscriptions and not one-off titles such as *Microsoft Dogs*. This was stressed in the definition of terms in the questionnaire. However, in spite of this, there might have been some misunderstanding. Libraries may have subscriptions with other on-line database providers and form part of a consortium which offer CD-ROM titles, too. Respondents could have included these.

1.7   Organisation of the Dissertation

In Chapter Two, CD-ROM technology is introduced. The researcher explains some of the applications and the advantages and disadvantages of the technology. The evolving nature of CD-ROM technology is presented, with insights into future projections.

The literature review can be found in Chapter Three. A survey of the relevant literature on CD-ROM technology is given. Appropriate literature from developing countries, and the African continent in particular, has been sourced and summarised in this chapter.

Chapter Four documents the research methodology used in the study. The researcher introduces the use of e-mail to collect data and distribute questionnaires. The advantages and disadvantages of e-mail for survey research, and the way the latter was overcome by the researcher, are briefly discussed.

A description of the findings of the study can be found in Chapter Five. Chapter Six comprises a discussion of the findings.

Chapter Seven draws conclusions and highlights issues and implications for university libraries. It lists areas for further research.

1.8   Summary

This introductory chapter provided an overview of the rationale for the study. Some brief background information to the study was provided. This was followed by the statement of the problem under investigation. The aim and objectives of the study were then listed and the significance of the study was described. This was followed by definitions of the terms used in the study and finally the limitations of the study were elucidated.

Chapter Two

An Overview of CD-ROM Technology

2   Introduction

In this Chapter, Compact Disc-Read Only Memory (CD-ROM) is introduced. CD-ROM is a plastic optical disc which makes use of a laser beam to read data. The different categories and types of optical discs are defined and the characteristics of CD-ROMs are discussed. The advantages and disadvantages of the CD-ROM as a publishing medium are presented. Chronological developments and trends in CD-ROM technologies form part of the concluding remarks on CD-ROMs.

2.1   Kinds of Read Only Memory (ROM) Optical Discs

Rowley (1998, 29-30) noted that there are different kinds of ROM optical discs, as can be seen in Table 1.

Table 1.   Different types of Read Only Discs

Types	Description
CD Audio (CD-DA)	Audio playback market.
CD-ROM	Laser-encoded optical memory storage medium on which digital data is stored.
CD-Interactive (CDI)	Stand alone system that connects to a standard TV. Developed for home multimedia entertainment.
CD-ROM Extended Architecture (CD-ROM XA)	Hybrid form that combines CD-ROM and CD-I capabilities to allow interleaved compressed sound and graphics.
CD-Video (VCD)	Contains moving pictures and quality stereo sound. VCD uses the MPEG standard to store video and audio in a high-density form.
Digital Video CD (DVD)	New standard for optical digital storage to store up to 25 times more information than current CD-ROM for high-quality video and audio.

2.2   Compact Disc-Read Only Memory (CD-ROM)

Compact discs first made a debut on the market in 1982. These discs were able to store up to 74 minutes of high-quality music and were known as CD-Audio. They are commonly associated with the music industry and have penetrated the music market. However, this 4.72-inch plastic disc, even though durable and programmable, could be "read only".

CD-ROM technology was perfected in 1985, when over 650 megabytes (MB) of data (roughly the equivalent of 460 high-density computer diskettes, or 25 000 pages of text) were compressed onto one disc. Unlike CD-Audio, the digital information on a CD-ROM disc contains text, graphics, audio and other media. When compared to the distribution costs of paper or diskettes, a compact disc provides an economical and durable way to publish and disseminate information (Barron, 1995: 16-17). Most CD-ROM technologies make use of hardware peripherals such as a computer, CD-ROM driver, CD-ROM disc, speakers or headphones, interface cable to connect the computer to the CD-ROM drive, a port or controller card in the computer and a software program to access the CD-ROM.

Rowley (1998: 241) notes that CD-ROMs may be grouped into six categories. These are:

1   Bibliographic databases which cover information on a subject field.

2   Catalogue and book-trade databases which enable one to identify the location of specific documents or assist in the selection of documents for collection development.

3   Source databases (document databases) which include computer software, images or sound, maps and charts, as well as text and numeric data.

4   Quick-reference databases are a form of source database which cover facts and figures similar to directories.

5   Mixed discs which contain a mixture of bibliographic, full-text and quick-reference data.

6   Multimedia databases which offer motion-picture graphics and sound and often allow for interactivity.

2.2.1 Applications to Library and Information Services

Ramaiah (1998, 376-377) points out that there are many CD-ROM applications for library and information service. These are:

- CD-ROMs as tools for library automation especially for cataloguing processes and catalogue publishing.
- CD-ROMs for the development of collections and bibliographic services.
- Reference tools such as encyclopaedias, dictionaries, directories, mapping services and yearbooks. Publishers produce full-text and multimedia CD-ROMs that cover different subject areas such as computing, agriculture and social sciences.

Table 2 shows how CD-ROMs can assist library and information services.

Table 2.   CD-ROM applications for Library and Information Services

Bibliographic Support Tool	Cataloguing
	Acquisitions
	Collection Development
	Inter-Library Loans Checking
	Verification of Reference Enquiries

Full-Text Sources	Original Works, Books
	Journals
	Newspapers

| Indexing and Abstracting Services | Journal and Periodical Sources |

2.3   Advantages and Disadvantages of CD-ROMs

Herther (1995) stated that CD-ROM technology has matured, especially with international developments in standards for the various CD-ROMs. Nevertheless, CD-ROMs have their advantages and disadvantages, as documented in the literature. The salient ones were summarised by Baron (1995), and Hanson and Day (1994).

2.3.1 Advantages of CD-ROMs

- *High Storage Capacity*

As a storage medium, CD-ROMs have the ability to store over 650MB of data, graphics, video and sound. Publishers have favoured this multimedia capacity. Many library-related databases and multi-volume reference works are now published in CD-ROM format.

- *Portability*

With advances in computing, a CD-ROM drive is a compulsory feature in most computers. Initially separate disc drives and peripherals were required to read CD-ROMs. This required libraries to purchase separate CD-ROM drives for the products from different publishers. There were different products on the market and made decision-making difficult for libraries especially when subscriptions lapsed. The discs are neat, easy to store and allow for easy transportation.

- *Low Cost of Replication*

Once a master has been pressed, duplication becomes effortless. This allows for multiple copies to be published, which makes distribution easier. Libraries are able to produce CD-ROMs in-house and, more importantly, inexpensively.

- *Durability*

The optical nature of CD-ROMs reduces physical handling. This increases protectability and resistance to damage. They are thus easy to use and need very little maintenance.

- *Able to be Networked*

The standardisation of technical details allows for CD-ROMs to be networked with different networking software products. Networking of CD-ROMs has increased end-user accessibility from not only the library but remotely via local and wide area networks. In this way effective use of CD-ROMs can be made by a wider population. Networking CD-ROMs is explored in this study. This has implications such as end-user training and licensing for access.

- *Healthy Publishing Market*

The availability of CD-ROM titles in the market has resulted in the need for a checklist of CD-ROM evaluation criteria. The publishing production cycle has been reduced significantly since the debut of CD-ROMs.

- *Affordability*

When compared with on-line sources of information, CD-ROMs are affordable to libraries with small budgets. CD-ROMs have been seen as a possible solution to expensive on-line databases by some African libraries, as argued by Adam (1997), Kebede (1996) and Phiri (1993).

2.3.2   Disadvantages of CD-ROMs

- *Read Only*

This is the primary drawback, as the discs cannot be updated once they have been published. The older titles have to be supplemented or replaced by newer ones. There is thus a time delay in publishing and distributing updated titles. Some university libraries are located in rural areas and receiving the updates via the post can take very long. Some vendors require the superceded discs be returned before the library receives the one update.

- *Lack of Standards for Retrieval Software*

There are some CD-ROM publishers which have their own search and retrieval software for their products. Libraries often subscribe to different vendor products and there is no standard and consistency in search software. End-users have to be trained to use the different CD-ROM products.

- *Speed*

They are relatively slower than on-line media. Variables such as disc drive and number of users on the network can greatly reduce the rate of access to information. To increase access time and speed will mean purchasing a faster disc drive, with concomitant cost implications.

- *Installing CD-ROM Software*

This can be troublesome and in some cases warrants expert help. Accompanying instructions and manuals are sometimes not adequate and the need to contact helpdesks becomes necessary. This can be problematic if vendors are located overseas and there is no local representative or office. Oyinloye (1999: 13) adds that "the introduction of CD-ROM in many African libraries has further challenged staff to become knowledgeable about a variety of operating systems, hardware configurations and software packages." In some cases libraries have to rely on IT staff from the Computing Centre to help with trouble-shooting. Many libraries do not have staff trained in technical aspects such as computer systems and library staff are forced to learn how to configure and install CD-ROM services.

- *Training End-Users*

Even though CD-ROMs are relatively easy to use, with pleasant graphical user interfaces, training end-users in effective searching could mean that there needs to be a planned user-education programme. Very often end-users encounter CD-ROMs for the very first time in university libraries. Thus university libraries need to develop appropriate user-education programmes to teach end-users how to use the service. This incurs staff and other costs such as the printing of learning materials.

2.4   Trends and Developments in CD-ROM Technology

Hattery (1998) cautions that

> "CD-ROMs offer organisations a simple, cost-effective way to access and archive realms of information and multimedia. However, keeping pace with the CD-ROM industry's rapidly advancing technology and short-product life cycle is a challenge for librarians faced with selecting the most appropriate solutions for user information needs."

2.4.1   Digital Versatile (or Video) Disc (DVD)

DVD is the next generation of optical storage medium after CD-ROM. DVD offers increased speeds of over 24 times and high-density storage capability. Herther (1996, 89-90) explained that DVD is physically very much like the traditional CD-ROM, but that it offers greater data density. A standard DVD can hold 4.7 gigabytes of data, which is seven times more than the current compact disc. DVD will allow for higher-

resolution pictures, more channels of digital sound, richer graphics and far more multimedia. DVD offers full-length movies, longer video segments, and other multimedia encyclopaedias and game discs. DVD-ROM is yet another generation of optical media. DVD-ROM and DVD Random Access Memory (DVD-RAM) will allow for advanced information storage and retrieval features in applications such as document imaging, records retention, desktop publishing, computer-aided design and manufacturing and video production and distribution.

The DVD market is set to expand rapidly and DVD will replace CD as a storage medium. As predicted by Barr (1999),

> "According to the 1999 *DISK/TREND Report* on optical and removable disc drives, DVD-ROM drive shipments will exceed the level for CD-ROM drives within two years and by 2002 will be three times the level for CD-ROM drives. CD-ROM sales revenue is predicted to drop from \$4.29 billion in 1998 to \$803 million in 2002. Conversely, DVD-ROM sales are projected to soar from \$650 million in 1998 to \$4.24 billion in 2002."

A survey through the literature on DVD applications in the library and information profession reveals limited case studies on actual use. Most of the articles refer to the possible applications. This could be attributed to the fact that libraries are monitoring developments and find the present use of CD-ROM as meeting their immediate information storage and retrieval needs.

2.5 Chronological Evolution of CD Technology

PC Magazine On-line (1997) presented a series of useful references on 21st century storage media, of which CD and DVD technology was reviewed. In summary, the milestones in CD technology are illustrated in Table 3.

Table 3.   Chronological development of CD-ROM Technology

Table 3 highlights the development of CD-ROM technology. The continual developments and changes highlight the evolving nature of CD-ROM technology. Libraries have to keep up-to-date with the changes in CD-ROM technology and this can result in increasing costs. Budgeting for CD-ROM technology needs to be planned taking into account trends and developments in CD-ROM technology.

Year	Milestone
1980	CD-Audio Philips and Sony create standards for optical disc-based digital audio format.
1983	CD Players Sony introduces the first audio CD player. The first CD title is Billy Joel's *52nd Street*.
1985	CD-ROM: Philips and Sony announce the standard for compact disc-read-only memory for computer data.
1987	CD-ROM drive: THE CD-ROM format bows into the PC arena. The read-only discs hold 650MB of data.
1994	4X Speed CD-ROM drives introduced.
1995	6X Speed CD-ROM drive introduced.
1996	8X Speed CD-ROM drive introduced. 10X and 12X Speed CD-ROM drives introduced. CD-R prices for compact disc-recordable drives start to drop. This technology allows mainstream PC users to create their own 650MB CD-ROMs for data archiving or distribution. The user can write to each blank disc only once.
1997	CD-RW Compact disc-rewriteable (also called erasable) drives and media lets users overwrite files on CDs they created. DVD-ROM: These read-only discs hold 4.7GB of data, and the format is standard to both the PC and the consumer electronics markets.
1998	High-Capacity DVD-ROM: 8.5GB for dual layer designs; to 9.7GB for double-sided, single-layer implementations; and to 17GB for double-sided, dual layer designs. DVD-RAM: DVD-random access memory drives let users create their own 2.6GB DVDs.

2.6   Summary

This chapter introduced CD-ROM technology and discussed the kinds of read only optical media. CD-ROM applications for library and information services were presented. The advantages of CD-ROMs such as the high storage capacity, the ability to be networked and the healthy CD-ROM publishing market were discussed. The disadvantages of CD-ROM technology were highlighted too. The developments and trends in CD-ROM technology were outlined and in so doing the evolving nature of CD-ROMs was illustrated.

Chapter Three

Literature Review

3   Introduction

A keyword search for CD-ROMs on any database can yield no less than ten records, let alone the thousands of records retrieved from the Internet, collated from the multitude of search engines. There is no doubt that CD-ROMs have been widely researched and documented in the literature. Dedicated journals, conferences and workshops have given extensive coverage to CD-ROM technology. Examples of the former include *Laserdisc Professional*, *On-line and CD-ROM Review*, the *Electronic Library* and the *Journal of Information Science* and *CD-ROM Professional*, *DVD Professional* and *EMedia Professional* and the annual International On-line Information Meetings. For the purposes of this study, the researcher scanned printed resources and on-line databases such as, ProQuest, LISA, WilsonWeb and Emerald. The Internet was searched for the latest information on CD-ROM trends and developments. The literature review acknowledges the wealth of information from developed countries that raises universal issues and developments related to CD-ROMs. In this chapter the relevant literature of importance to the present study is reviewed.

3.1   CD-ROM Themes from the Literature

A study by East and Leach (1998) on the availability of CD-ROMs in libraries in the United Kingdom focussed on issues such as expenditure, holdings, networking of CD-ROMs and cancellations. The results from this study indicated when purchasing on-line databases, CD-ROMs remained a popular format for electronic information. The surveyed institutions reflected an increase in the number of CD-ROM titles purchased. This study provided the present researcher with themes to be covered in the survey in the present study. The study by East and Leach (1998) noted that future subscriptions to CD-ROM products was being investigated and negotiated at national level to obtain databases for the whole academic community via networks. Thus all

libraries would have access to networked electronic information resources. User preference for on-line and Web services was highlighted in the survey too.

A study by Budd and Williams (1993) surveyed general management aspects of CD-ROMs in academic libraries in the United States of America. Their study addressed questions such as the number of products libraries subscribed to, sources of funding, usage and the comparison of on-line searching over a period of time and the cancellation of print sources as a result of on-line or CD-ROM availability. This study assisted the researcher to formulate the present study, in which similar questions were drawn up to determine the scenario in South African university libraries.

The "African" literature on CD-ROMs emerged in about the mid-1990s and is noteworthy as researchers focus on a variety of issues. Drawing from experiences in developed countries, authors documented the relevance and potential of CD-ROMs in Africa. Data was collected by means of surveys and presented in case study format. Related to this study, the researcher found studies by Tefera, Wood and Ford (1999), Adeniran _et al_. (1994) and Dubbeld (1991) were useful. These studies surveyed CD-ROMs in a similar context and raised similar issues. The first two surveyed libraries and information centres in general. The third surveyed university libraries, only.

In the first reference, Tefera, Wood and Ford (1999), pointed out that in Ethiopia CD-ROM services had made little impact as they were often used only by a select category of users. Results from their study showed that academic library users made the largest group of CD-ROM users (45%); followed by research and development libraries (27%) and non-government libraries (27%). The reason for the higher usage of CD-ROMs in academic libraries was related to the accessible workstations and the large undergraduate student numbers. In general, they also found that there were few records of usage statistics, a low number of searches being performed by users and a low awareness of the facilities.

Adeniran _et al_. (1994) surveyed CD-ROM products in Nigerian libraries and information centres. The study determined the sources of funding of CD-ROM products, information about users, hardware configuration and training facilities in Nigeria. The appended survey instrument in the article assisted the researcher in

designing the questionnaire used in the present study. The study concluded that CDs were well received in Nigeria. This indicated that the concept of the electronic library is becoming accepted in developing countries.

The third study, conducted by Dubbeld (1991) from the University of Natal, Durban, was an informal survey of twelve South African university libraries. This study was the most relevant to the present researcher, as far as significance or importance to the present study was concerned. Even though Dubbeld's (1991) study researched whether CD-ROM was a viable alternative to on-line searching in academic libraries, she highlighted some issues common to the present study. These were: heavily used databases, funding methods and cost recovery, staff investment and end-user training and user access. Even though this article was useful, it had shortcomings as it was an informal survey. There was no comparative and analytical data from the different institutions. The study was conducted in 1991 and since then there have been developments in CD-ROM technology and within South African university libraries. The study could thus be considered dated.

Other case studies from South African institutions were published in the *Electronic Library* in 1995. These case studies reflected examples from mostly HWI and illustrated the extent to which these libraries had embraced CD-ROM technology. These articles are referred to in the present study where various issues and challenges such as cost, end-user training and subscriptions are discussed.

3.1.1 Appropriate IT Infrastructure

Sturges and Neil (1998) noted that the "famine in information technology (IT)" in Africa is evident in many libraries, too. They cautioned against the "dependency on the West" syndrome and against widening the IT-rich and IT-poor chasm. Mwinyimbegu (1993) lists numerous obstacles to IT transfer in developing countries. He stresses the need for developing countries to become less dependent on developed countries. Personal, economic, operational and infrastructural obstacles can be removed by educating national decision-makers, reducing prices, establishing agreements with IT manufacturers and getting industrialised nations to assist in

technical and managerial areas, so that developing countries can become self-sufficient.

Sturges and Neil (1998) argued that while African libraries may not offer access to a wide range of on-line databases, CD-ROMs offer great potential for social and economic advancement in developing countries, by providing access to up-to-date information in electronic format. Wilcocks (1996) cites Kebede (1996), who views "CD-ROM as appropriate technology for developing countries, with low financial input and weak infrastructure, as against on-line technology." The extent to which South African libraries have developed infrastructures for CD-ROM technology is stressed in the present study, with questions on access to other networks and whether the institution had an IT policy which could impact on the IT infrastructure and the services the library provides.

3.1.2   Comparison between On-line Databases and CD-ROMs

Various authors compare the advantages and disadvantages of CD-ROM and on-line databases. Zulu (1994) supported the adoption of CD-ROM technology rather than on-line services. Debating the high connectivity costs and poor telecommunications infrastructure, Zulu concluded that CD-ROMs are telecommunication-independent even though they can be expensive to acquire. Phiri (1993) discussed why CD-ROMs are better than on-line databases for developing countries. She categorised CD-ROM as a form of electronic publishing. She quotes Nicholls and Majid (1989) when comparing the cost of print, on-line and CD-ROM media. They state "the start up cost of a print service is largely confined to the price of the books, and the on-line start up costs involves a workstation and the cost of the discs." Of the three media, on-line incurs high on-going variable costs such as telecommunications and this makes budgeting more difficult. Phiri (1993) pointed out that when compared with on-line costs, CD-ROM had fewer variable costs which made it more affordable, especially for Zambia, which has a poor telecommunications infrastructure and lacks technical expertise and qualified information professionals. The variable costs are important factors to consider when implementing a CD-ROM service.

Dubbeld (1991) questions whether CD-ROM is a viable alternative to on-line searching. She concluded that "although CD-ROM was found to be more economical

than on-line searching, the real problem would appear to be that South African academic libraries, in acquiring CD-ROM, would be forced to choose, not between CD-ROM and on-line, but between CD-ROM and hard-copy databases." (Dubbeld 1991: 245). On the other hand, a study by Abrahams *et al*. (1996) at the University of the Western Cape, reckoned that the cost of searching an on-line database such as Dialog worked out much cheaper than an annual CD-ROM subscription, depending on whether the usage of CD-ROMs increased with time. " Even if the library retains its current subscription to printed abstracts and, in addition, subscribes to Dialog services, its total expenditure would still be less than subscribing to the CD-ROM and print versions." (Abrahams *et al*., 1996: 77). Sustaining the service is critical for libraries planning and implementing CD-ROM technology.

The decision whether to maintain parallel collections, viz. print and CD-ROM, is one that requires careful evaluation based on usage and a critical mass of users. In the present study the researcher surveyed whether or not libraries had cancelled subscriptions to print collections. The researcher surveyed whether libraries subscribed to other on-line services. Achieving a critical mass of users will depend on user education programmes - a question which the researcher included in the survey.

Increasingly, publishers are making databases available on the Web. Libraries with Internet access and connectivity are able to keep up-to-date with the technology, but libraries in developing countries with poor telecommunications infrastructure are finding it hard to do so. Relating to the issue of Web access, Adam (1997) considers that the hybrid CD-ROM has potential for application in Africa. The feasibility of combining CD-ROMs with on-line networks helps to reduce the information gaps in Africa. The hybrid CD-ROM combines static information on the CD-ROM with up-to-date information from the Internet. This will reduce costs. "Hybrid CD-ROM/Internet fits regular user behaviour. Users want to pay for immediacy but not for information they use again and again. They usually opt for local fast access to information and go for on-line materials occasionally" (Adam, 1997: 213). Subba Rao (1998) explained that hybrid solutions for information delivery are those "that deliver some amount of information accessible electronically and augment it with information from another source delivered on a different medium, which is being used today by

innovative publishers and agencies." In this way, libraries can obtain updates and up-to-date information by connecting to the publisher's website and downloading the updates, which can then be accessed off-line from the library's server. The extent to which libraries in South Africa have access to the Internet is surveyed in the present study. It could, as noted, impact on the provision of CD-ROM services.

3.1.3   Funding and Subscriptions

The introduction of CD-ROM technology in some African libraries was made possible through foreign funding and aid. This has advantages and disadvantages as stated by authors such as Nkereuwem (1996) and Kanamugire (1995). Some of the problems with international sponsorship, pointed out by Nkereuwen (1996), include sporadic and unco-ordinated support, problems with hardware and software compatibility, terms and conditions set for the use and purchase of software and no support for promotion. Kanamugire (1995: 111) warned that:

> recipient institutions must be committed to continuing the service when aid from donor agencies ceases. Donors can assist in developing sustainable CD-ROM services by gradually developing in-built mechanisms for continuity through training local information professionals and marketing information services to influential and powerful users such as policy-makers and administrators...Self reliance should replace the "dependency syndrome" – the trend to depend on donors for every item needed for the CD-ROM service. This may be accomplished through charging for CD-ROM services as well as developing income-generating activities and services.

The American Association for the Advancement of Science (AAAS) initiated various projects to introduce CD-ROM technology in academic libraries in sub-Saharan Africa. A workshop held in Ghana in 1993 on marketing CD-ROMs helped librarians to develop promotion and marketing plans for CD-ROMs, to create awareness and usage of CD-ROMs. Another project under the auspices of the AAAS provided guidelines for selecting CD-ROM databases for African research needs. Levey, Ngwira and Patrikios (1996) emphasised that many institutions subscribe to CD-ROM databases that are inappropriate to their needs.

> These databases, which can be very expensive, can take up a lion's share of a library's budget, leaving little room to acquire other materials - additional databases, document delivery services, journal subscriptions, books, etc. Moreover, although database acquisition might be underwritten by donor funding at the outset, grants inevitably expire, leaving librarians with the

dilemma of finding money to pay for subscription renewals, thus calling into question the long-term sustainability of CD-ROM utilization at their institutions (Levey, Ngwira and Patrikios, 1996: 5-6).

Dubbeld (1991: 249) found that

> "As far as the question of affordability of CD-ROM databases is concerned, South African academic libraries certainly seem to be affording them, from a sample of twelve out of more than twenty university libraries. Whether they will become more or less affordable as time goes on, only time will show."

Dubbeld's (1991) study lacked any data from the different libraries on sources of funding. The present work investigated sources of funding for CD-ROM services and gauged the extent to which libraries have a separate budget for CD-ROMs and whether their budgets have increased or decreased.

3.1.4   Acquisition and Selection of Databases

Kanamugire (1995) stated that many of the databases published by producers are created for American and European markets by the very nature of their scope and coverage and that the amount of African or localised content is limited. Other problems are language and licensing agreements. Moodley and Vilakazi (1996), at the University of Durban-Westville, evaluated gender studies information on CD-ROMs and discovered that there was limited reference to African research and writing. Kanamugire (1995: 112) stated that there was a need to establish partnerships with database publishers and vendors, donor agencies and national agencies or local recipient institutions.

> To meet the peculiar requirements of developing countries, CD-ROM publishers and vendors should adequately cover information sources from developing countries such as Arabic sources and reconsider licensing and pricing of CD-ROM products.

Libraries are finding it difficult to subscribe to many databases because of financial constraints. The selection of relevant databases is thus important. From the literature reviewed, there has not been an inventory of databases available in all South African university libraries. A survey of CD-ROM subscriptions is undertaken in the present study. This impacts on resource sharing, which is surveyed in the study.

3.1.5 Resource Sharing

Silverman (1990) noted that due to pressure in funding, libraries had engaged in setting up co-operative efforts such as the Pennsylvania Area Library Network (PALINET), which has assisted libraries in obtaining hardware and the CD products themselves at discounted prices for member libraries. PALINET plays the role of brokering. "Operating as a not-for-profit multi-type library co-operative, PALINET is a diversified network engaged in developing, producing, marketing, and supporting computer-based products and services to its members" (Silverman, 1990: 50). The co-operative provides training for members to keep up with the technology. Even though the above reference is dated, it is significant in that libraries are now forming consortia for resource sharing.

In South Africa too, efforts are underway to form consortiums for resource sharing. Darch and Underwood (1999: 288-289) stated that:

> There is scarcely an academic library left in the world that had the financial resources to purchase all the monographs and journals that it needs, let alone that it wants. Almost all library consortia therefore attempt to rationalise the building and use of information resource collections through sharing, through granting access (which is "better than ownership", as we all now know)...In general, South African academic libraries are still in the process of positioning themselves for the kind of consortial purchasing of electronic information products which is now common in North America and other parts of the world.

They (Darch and Underwood, 1999: 289) pointed out that:

> "There are five major academic library consortia in South Africa, of which two, based in Johannesburg and Cape Town, have reached an advanced state of development...The five groups are:
> 1   SEALS, in the Eastern Cape, one of the country's poorest regions;
> 2   GAELIC, based in Gauteng, South Africa's smallest but richest and most economically dynamic province;
> 3   FRELICO, in the Free State, with strong links to GAELIC;
> 4   CALICO, in the greater Cape Town area;
> 5   ESAL, in KwaZulu-Natal."

Edwards (1999) said that the formation of GAELIC (The Gauteng and Environs Library Consortium) focuses on ICT-based resource sharing.

> Resource sharing has been a major focus of GAELIC since inception, and is currently concentrated in the areas of collection development, human resources and document supply. A pilot project, sponsored by the Open Society Foundation (South Africa) and involving two electronic full-text databases, has provided an opportunity to use and evaluate databases, to gain experience in price negotiations and vendor attitudes, and to test remote access and the technological infrastructures on local campuses. The exercise highlighted the need to obtain written commitment from participating institutions. Subsequently, several favourable contracts have been signed with suppliers, and cost-effective purchasing is becoming a reality.

The number of libraries participating in CD-ROM resource sharing is surveyed in the present study.

3.1.6   CD-ROM Networking

CD-ROMs in libraries were initially launched as stand-alone services. However, with advances in CD-ROM technology, they can now be networked across either a local area network (LAN) or a wide area network (WAN), where information is delivered to the end-user's desktop. Further implications for the library included negotiating licensing that allow for networking their CD-ROMs. Because many of the CD-ROMs are not really "owned" by libraries, they will have to consider how best to optimise on networks to recover some of costs. Silverman (1990: 58) explains that "with CD-ROM products, typically, all compact discs, software, and manuals must be returned to the vendor upon cancellation." This is based on the licensing agreements. Van Brakel (1991a) noted the use of the "electronic workstation" to provide opportunities for end-users to access a range of electronic information services such as CD-ROMs. "These are configured to access the organisation's OPAC (digital or optical), various CD-ROM databases, and to provide internal e-mail facilities, for communication with staff and for interlending loan activities, for example" (Van Brakel, 1991a: 213). This has many implications for the librarian and the end-user. For the librarian, it would mean that CD-ROMs can be networked. This often entails additional costs. The end-user can access information resources remotely without even having to visit the library. Case studies on CD-ROM networking in South African academic libraries emerged in the mid-1990s.

Lees (1995) described the Electronic Reference Library for Southern Africa (ELSA) project, which involved vendors and service providers. This project experimented with different facets of electronic information service delivery. The study showed the benefits of networking, where issues such as administering a collection of databases locally is eliminated, and a new business model of database subscriptions can be worked out with vendors when networking their CD-ROMs.

UNISA's experience with networking their CD-ROM collection is documented by Synman (1995). The decision to network had various advantages, including the access to interdisciplinary databases, more than one user access and less handling of CD-ROMs. However, aspects such as pricing, licensing, access control, marketing and training were new challenges facing the library.

The decision to network CD-ROMs needs to be carefully planned. Issues such as which databases to network, end-user training and support and licensing must be carefully considered. The present study investigated the networking of CD-ROM collections and network support for end-users.

3.1.7 End-User Training and Promotion

Wilcocks (1996) showed that, at the University of the Witwatersrand (WITS), making the CD-ROMs accessible on the LAN provided opportunities for expanding the library service to end-users. However, the need to train end-users and librarians became an added service the library had to provide, especially since the university is a multi-site campus, or when there are divisional or branch libraries. This often requires additional human resources and becomes a full-time job. Wilcocks (1996) quotes Van Brakel (1993), who suggests

> "that in-service training and end-user training be carefully planned to optimise the use of IT facilities in the library. Training should be addressed at all levels from current awareness to retrospective searches. Orientation training sessions should be followed up by more intensive instruction either formally of informally as one-on-one instruction. For this to be effective all librarians involved with CD-ROM facilities need to be carefully trained in their use."

Snyman (1995) noticed that at the University of South Africa (UNISA) the networking of CD-ROMs meant marketing and training users. This resulted in the formation of a training committee.

MacKellar and Elliott (1999) stressed the importance of CD-ROM training for students, and that they should be taught by "trained searchers, librarians, or information professionals from the old Boolean school. Basic principles are important. Technical support does not replace training." They provide a checklist for CD-ROM training with includes pre- and post-training activities. The article notes that the CD-ROM is a format for computer-based training (CBT) and that tele-learning and Internet seminars are becoming popular learning tools.

Networking CD-ROMs requires training, promotion and marketing. These activities are on-going and libraries need to consider this when deciding to implement a CD-ROM service or network their CD-ROMs. Trained users are able to create the critical mass sometimes needed to justify the cost effectiveness of CD-ROM technology. The extent to which end-user training is offered by the different university libraries in South Africa is covered in the present study.

3.2   Concluding Remarks

The literature documented and reviewed above reflects case studies of initiatives undertaken by individual libraries. Upon closer examination it is realised that many of the South African case studies are from the previously HWI such as UNISA, RAU, WITS and Natal University. Many of the papers were published in the mid-1990s, and between 1993 and 1996. One notices that these libraries were able to implement CD-ROM networks. This would imply that these libraries were able to afford the necessary infrastructure and financial and human resources, too. There is little representation in the literature of the HBI. The reported case studies from UDW and UWC were those under the AAAS project mentioned above.

3.3   Summary

In this chapter the literature on CD-ROM technology was reviewed. Three case studies using the survey methodology highlighted CD-ROM management issues in academic libraries. Various published sources exist on this topic, but for the purpose of the present study only the relevant articles have been reviewed. Experiences with CD-ROM technology documented by the researchers noted that CD-ROM technology

is constantly changing and even though CD-ROM has been accepted in academic libraries, the challenge facing such libraries is how to keep up with developments in the technology. This chapter reviewed themes such as IT infrastructure, the cost comparisons between on-line databases and CD-ROMs, collection development issues, resource sharing, CD-ROM networking and end-user training and promotion.

Chapter Four

Methodology

4   Introduction

This chapter discusses the research methodology used in the present study. The advantages and disadvantages of e-mail to design survey questionnaires and collect data are examined and tabulated. The distribution and response rate of the survey instrument is presented. The reliability and validity of the research is discussed.

4.1   Survey Method

Dillman (2000: 352) states that

> "the way data is being collected by survey research is being transformed with the advances in technology. Methodologies included amongst the traditional postal technique is the collection of survey data through self-administered electronic surveys by e-mail; the World Wide Web; and Interactive Voice Response (IVR), or, in its original form, touch-tone data entry (TDE)."

For the purpose of the present study, the researcher demonstrates the use of the self-completed e-mail questionnaire as the survey instrument for data collection rather than the traditional postal questionnaire. The traditional printed postal questionnaire has been exhaustively documented in the literature by authors such as Leedy (1993) and Powell (1997).

4.1.1   Using Electronic Mail (e-mail) for Survey Research and Data Collection

The Internet has been synonymous with e-mail. E-mail transcends global geographic boundaries for those with access. E-mail as a form of computer-mediated communication (CMC) has proliferated in businesses and the academic community. Selwyn and Robson (1998) examine research on the use of e-mail in applications such

as undergraduate teaching, mentoring and discussion groups. Electronic mail is increasingly being used to distribute surveys on the Internet.

Mehta and Sivada (1995) illustrate the development and acceptance of e-mail as a potential form of communication for research,

> "primarily in the form of quantitative instruments such as electronic questionnaires and, to a lesser extent, qualitative methods such as electronic interviews and electronic "focus groups". Careful consideration of these new methods is needed if they are to be used effectively in the social sciences."

There is a distinction between web-page based surveys and e-mail surveys. The former collect data from a wider, uncontrolled sample, whereas the latter focus on a smaller, homogenous on-line group. In e-mail surveys, the respondent is sent a questionnaire to his or her account. Thus the researcher needs to have a list of e-mail addresses of participants. For web-page based surveys, anyone who visits the website may be participate in the survey.

There is adequate evidence in the literature of studies of the advantages and disadvantages of e-mail questionnaire surveys, as compared with traditional postal surveys. These advantages and disadvantages will be discussed below. Where appropriate, they will be related to the present study.

4.1.1.1 Advantages of E-Mail

4.1.1.1.1 Proliferation of E-Mail

With almost "free" e-mail services such as *Yahoo!* and *Hotmail* on the Internet, anyone with access to a personal computer and the Internet can acquire an e-mail address. Increasingly, most universities provide Internet access to staff and students. The establishment of "cyber cafes" globally offers users greater access to the Internet and e-mail. Thus, one does not need to be at one physical address to receive and complete the questionnaire as long as he or she has access to the system. Accessibility creates a larger population and sample size, which can be polled faster than with traditional postal method.

4.1.1.1.2   Access to Names

The Internet allows one to find and locate a person's e-mail address easily. Service providers are publishing on-line directories of subscribers. Organisations include e-mail addresses in corporate handbooks in print and electronic formats. The present researcher was able to locate a list of university librarian's e-mail addresses from the Internet on a library's "homepage". In this way a sample can be selected. E-mail surveys are less likely than mail surveys to be "intercepted" by someone else, as they go to an individual's personal e-mail address.

4.1.1.1.3   Response Rates

Various studies have been conducted to test the response rate of e-mail questionnaire surveys. Kawasaki and Raven (1995) found that to eliminate non-response they had to send out a hard copy of the cover letter first and follow up with the e-mail survey three days later. Follow-up e-mail messages can be sent to improve response rates. The present researcher was able to send follow-up e-mail messages to respondents. People tend to check their e-mail regularly and the respondents may act on it immediately or complete the survey at their own convenience. The "loss" of an e-mail questionnaire is reduced in that it is only lost once the respondent deletes it. E-mail questionnaires offer ease and flexibility of response, as the questionnaire may be printed-out, faxed or posted.

4.1.1.1.4   Ease of Use

The present researcher used the e-mail survey technique in another study (Munoo, 1996) and is comfortable with the design and administration thereof, especially since the population of the present study was not a large one. The e-mail questionnaire may be composed in the actual e-mail being sent out or may be sent as an attachment using word processing software.

4.1.1.1.5   Costs

E-mail can reduce costs especially if there is a large sample. Sheehan and Hoy (1999) and Tse (1998) noted that e-mail offers savings in cost, as compared to traditional mail and telephone surveys. E-mail is faster to transmit and reduces paper or stationery costs. The present researcher, who is based in Singapore, was able to save

time and telecommunication costs, as the population being surveyed was in South Africa.

4.1.1.2 Disadvantages of E-Mail

4.1.1.2.1 Familiarity with IT

Respondents may not be comfortable with responding to an e-mail questionnaire survey. If respondents are not very IT-literate they may have problems extracting attachments and managing electronic information. Issues such as software compatibility must be taken into consideration. Clear instructions must be given in the covering letter. Technical difficulties such as software compatibilities can influence response rates.

4.1.1.2.2 Bias

Krasilovsky (1996) cautioned that younger, experienced computer users employed e-mail more often than older people. This could yield selective responses, depending on the topic and focus of the survey. Furthermore, the sample could be biased along class, race, age, income and gender lines.

4.1.1.2.3 Information Overload

E-mail surveys could be regarded as "junk mail" with the growth in computer-mediated communication and information overload. A well-intended survey might be considered as "junk mail". The respondent might choose not to act upon it immediately, resulting in delayed responses.

4.1.1.2.4 Anonymity

It is very difficult to guarantee complete respondent anonymity, as names are attached automatically to their replies. Respondents need to be reassured of confidentiality.

4.1.1.2.5 Currency of E-mail Addresses

E-mail addresses may become out-of-date and this results in delivery failure. It is important to determine the currency of addresses in the design stage, where an initial e-mail can be sent as the covering letter and the actual questionnaire can be sent subsequently. The present researcher experienced delivery failure messages and non-

response from some institutions. To overcome this problem he visited the "homepages" of libraries from the different institutions' Web pages to determine the e-mail addresses of library staff.

4.1.1.2.6   Technical Design

Depending upon the software used, most e-mail surveys are limited to plain text, although graphics can be sent as e-mail attachments that are decoded separately from the questionnaire text. Creating grids and scale responses cannot be done in a visually attractive way. Respondents may damage the questionnaire text in the process of responding, making automatic data extraction impossible and requiring hand coding of damaged responses. Even though the present researcher provided technical information such as the software used and the instructions on how to extract the questionnaire, some respondents typed in different fonts and attached files in different formats. The researcher had to get technical help to overcome these problems.

4.1.1.2.7.1   Contact Persons

It is useful to send the e-mail questionnaire to appropriate individuals as this could influence the speed of the returns. The researcher did not specify a date by when the questionnaire was to be completed and returned. In the present research the questionnaire was sent initially to the university librarians at the different university libraries. There was no response from them. In this study, the university librarians were not the "best" persons to complete the survey as they tend not to deal with "operational" issues such as completing survey forms. It is important to highlight in the covering letter that should the recipient not be the appropriate person to complete the survey, it should be forwarded to the relevant persons. This is useful if some departments in institutions have common e-mail accounts.

In Table 4, Thach (1995) summarises the advantages and disadvantages of surveying by e-mail.

Table 4.   **Advantages and disadvantages of E-mail for Survey Research**

Advantages	Disadvantages
Cost-savings.	Sample demographic limitations.
Ease of editing.	Lower levels of confidentiality.
Faster transmission time.	Layout, formatting and presentation can be difficult.
Easy use of invitations.	Additional instructions.
Higher response rate.	Technical problems are possible.
More candid responses.	
Quick response time.	
Wider magnitude and coverage.	

4.2   Questionnaire Design and Structure

Dillman (2000: 32) warned that "the goal of writing a survey question for self-administration is to develop a query that every potential respondent will interpret in the same way, be able to respond accurately, and be willing to answer. However, in practice, producing good questions is often difficult."

The objectives of the questionnaire used in the present study were to elicit information on the *status quo* of CD-ROM technology in university libraries with regards to subscriptions and collection, budget, access and end-user training. In addition, general issues relating to the development of CD-ROM technology were posited. Clear definition of terms and instructions were given to respondents so that they could complete the questionnaire. Furthermore, help in extracting the questionnaire as an e-mail attachment was provided.

There were eight sections in the questionnaire, with a table in the appendix. The first section of the questionnaire covered issues related to subscriptions and collections. The objectives of these questions were to ascertain the availability of CD-ROMs in the respective libraries. Another question in this section required respondents to provide a list of CD-ROM titles being subscribed to by their libraries. Related to this section were questions on budget, where respondents had to indicate the source of funding and its impact on subscriptions to printed indexes, abstracts and journals.

The accessibility of CD-ROMs to students and academic staff was surveyed in the fourth section. The means of access were explored in questions relating to whether CD-ROMs were networked in libraries. As CD-ROMs are expensive acquisitions by the library, effective use is warranted and thus questions on end-user training and statistical management of use were asked. The latter allows for the monitoring of specific titles and acts as an aid for promotion and decision-making relating to subscriptions. Resource sharing was explored in the questionnaire. In the final section respondents were asked general questions about access to on-line databases and the Internet.

Fink (1998: 9) explained that "survey questions may be forced choice or open-ended. Forced-choice questions with several choices are easier to score than open-ended, short answer, essay questions. Open-ended questions give respondents an opportunity to state a position in their own words. Unfortunately, these words may be difficult to interpret." In the present study the researcher used forced-choice or closed-ended questions, which were "yes" and "no" type questions, and open-ended questions. In most instances the closed questions were followed with open-ended questions for brief descriptions. The table for the CD-ROM title list was appended. To save the input time of the respondent, the researcher selected CD-ROM titles from the University of Fort Hare (UFH) and the University of South Africa (UNISA) and these were listed in the questionnaire. It was clearly stipulated that this was by no means an exhaustive list.

4.3   Pre-Testing the Questionnaire

Powell (1997) stresses the importance of pre-testing a questionnaire:

> A pre-test gives the researcher an opportunity to identify questionnaire items that tend to be misunderstood by the participants, do not obtain the information that is needed etc…The pre-test offers certain advantages beyond helping to refine the data collection instrument. It can permit a preliminary testing of the hypothesis, point out a variety of problems not anticipated relating to design and methodology, facilitate a practice run of the statistical procedures to be used, and perhaps even indicate that the final study may not produce any meaningful results and therefore should be rethought or abandoned.

The present researcher designed the questionnaire and then pre-tested the questionnaire with three information services librarians in academic libraries in Singapore. E-mail is a common form of communication in all academic libraries in Singapore. Respondents were aware that this questionnaire was designed for a South African population and wanted clarification on some of the abbreviations and acronyms used. The researcher explained these concepts to the respondents telephonically and asked respondents to omit them, as this was only a pre-test. With regards to responding to a survey via e-mail, the respondents had no difficulty in extracting and completing the questionnaire. Feedback from the pre-test showed that the questionnaire was clear and understandable. However, one respondent complained that the questionnaire was a little too long and suggested that some questions might need input from colleagues in other departments or different sections of the library.

4.4   Population

The word population refers to any group of persons, objects or institutions that have at least one characteristic in common. For the present study the population surveyed was twenty-two main university libraries in South Africa. Branch or regional libraries of universities for example UNISA and VISTA were not surveyed. There was thus no sampling in this study. The common characteristic among the population was the fact that they were main libraries located on the main campuses, providing services to the university population which comprised of both students and academic staff. Twenty-two university libraries were surveyed. The population was made up of HWI and HBI.

4.5 Distribution of the Questionnaire

Twenty-two questionnaires were e-mailed to identified individuals at the institutions. E-mail addresses of contact persons from the different institutions were found on the Rhodes University Library "homepage". The researcher only had access to e-mail addresses for university librarians. The first set of questionnaires were e-mailed to the university librarians in November 1999 hoping they would be forwarded to the relevant individuals in the different libraries. However there was no response. The researcher then found e-mail addresses of information services and subject librarians on the websites of the different university libraries "homepages". In 2000, reminder e-mail questionnaires were sent to the institutions which had not yet responded. The researcher located the e-mail addresses of either the information services librarians or subject librarians at the different libraries depending on the designation used by the different libraries. The researcher did not include a specified date by which the completed forms needed to be returned.

A covering letter (Appendix A) introducing the researcher and explaining the purpose of the study was sent to the university librarians. Clear instructions in a step-by-step format were provided to help the respondents to complete the survey. The actual questionnaire was included in the e-mail covering letter as a file attachment (Appendix B).

4.6 Response Rate

Eleven out of the twenty-two libraries responded, a response rate of 50%. Ten out of the eleven libraries e-mailed their returns to the researcher, while the eleventh was faxed to the researcher. There were no spoilt questionnaires or incomplete returns. This response provided the researcher with a reasonable number of returns to work with.

4.7 Validity and Reliability

Fink (1998: 27) states that one should pilot test a survey to see if it can be administered easily and according to plan. The main goal is to obtain reliable and valid survey data. Reliability refers to the consistency of the information one gets (people's answers should not keep changing) and validity refers to the accuracy of the information. One way to ensure the reliability and validity of a questionnaire-based

survey is to model the questionnaire on one that someone else has developed and tested.

Before designing the questionnaire, and for the purposes of the literature review, the researcher made reference to studies by Tefera, Wood and Ford (1999) on CD-ROM services in Ethiopia; East and Leach (1998), whose study was based on the continuing prominence of CD-ROMs in academic libraries; Adeniran *et al*. (1994) who surveyed the availability and use of CD-ROM products in Nigerian libraries and information centres; Budd and Williams' (1993) study on CD-ROMs in academic libraries in the United States. These studies assisted the present researcher during the conceptualisation and design of the questionnaire. The validity and reliability of data also means identifying a "reliable" person who will provide data that is "valid". It could be someone who is closely related to the subject matter or issue. In this study it could be library staff who work directly with CD-ROM technology.

4.7.1 Validity

Leedy (1993) elucidates the different forms of validity. For the purpose of the present study, the researcher found that face validity was important. This refers to the subjective judgement of the researcher and addresses questions on whether the instrument in fact measures what it is supposed to measure and whether the sample is representative of the population being studied. There was no sample in this study and the researcher surveyed the entire population. The researcher was able to elicit data from the South African university libraries which responded to the questionnaire.

The validity of the questionnaire was based on the types of questions that were asked. Questions were related to the topic and linked to the objectives. The questions were the same for all respondents and made use of concepts that respondents understood. Where necessary, definitions of terms were provided. The researcher made use of closed and some open-ended questions. This technique was used to reduce ambiguity. The questions asked were generic and were not unique to any particular library. No reference was made to any particular library or institution. Thus the survey instrument could be used again by anyone wanting to survey management issues related to CD-ROMs in academic libraries.

The survey instrument required only one response from one institution, the respondent being the contact person. As the questionnaire was returned by e-mail, the researcher had the e-mail address of the person who sent the questionnaire.

4.7.2   Reliability

Reliability refers to the accuracy of the instrument. If the study were to be duplicated using the same procedures and techniques, the same results should be obtained (Leedy, 1989: 30). There are a number of ways for checking the reliability of an instrument, one being the "test-retest". However, as Bell (1999: 104) points out, such checking mechanisms are not necessary unless one is attempting to produce a test or scale. She considers that the test for reliability comes at the stage of question wording and piloting of the instrument. The reliability of the survey instrument in the present study could be measured by printing out the questionnaire that was distributed in e-mail format and resending the questionnaire as a traditional postal survey. The researcher was able to compile a directory of university libraries in South Africa and the contact persons to whom the e-mail survey was sent. Anyone wanting to repeat the study would thus have points of contact and reference.

4.8   Data Analysis

The completed questionnaires were printed and collated. Since there were only eleven returns, this was a manageable number to work with. There was no need for any software programs to analyse the data and analysis was done manually. No professional advice or consultancy was needed. A composite table listing the different institutions was drawn up. In this way the researcher was able to view at a glance responses to the different questions. This aided the researcher and saved time.

4.9   Summary

In this chapter, the research methodology was discussed. The advantages and disadvantages of e-mail as a data collection technique were given and the design and structure of the questionnaire used were discussed. Other issues examined in the chapter included the distribution of the questionnaire and the validity, reliability and analysis of the data.

Chapter Five

Results

5   Introduction

The results of the survey are presented in this chapter.

A total of 22 questionnaires were sent out. Eleven fully completed questionnaires
were returned. This represents a 50% return rate. Responses were received from the
following institutions: Rand Afrikaans University (RAU), the University of Port
Elizabeth (UPE), the University of Natal, Durban (UND) and Pietermartizburg
(UNP), Rhodes University (Rhodes), the University of the Orange Free State (UOFS),
Potchefstroom University for Christian Higher Education (PUCHE), the University of
Fort Hare (UFH), the University of Transkei (UNITRA), the University of Durban-
Westville (UDW), and VISTA University. This represented four HBI and seven
HWI. Responses from HBI and HWI represented 40% and 64% respectively of the
total number of university libraries surveyed. No spoilt or incomplete questionnaires
were returned. Ten out of the eleven libraries returned their questionnaires via e-mail.
All four HBI completed their survey returns via e-mail. One library indicated that an
e-mail return was sent, but the researcher did not receive it. The questionnaire was
then faxed to the researcher.

The results are represented in tabular format. Average percentages have been given
for each question, where appropriate. Reponses to the open-ended questions are
presented last.

5.1.1 Year of CD-ROM Acquisition

Table 5. Year in which Libraries Acquired CD-ROMs

Year of CD-ROM Acquisition	n=11	%
Less than a year ago	0	0
1-4 years ago	1	9
5-8 years ago	6	55
More than 9 years ago	4	36
Total	**11**	**100**

All libraries (100%) that participated in the survey had CD-ROM collections in their libraries. However, the years in which the CD-ROMs were acquired varied.

Most libraries (55%) had acquired CD-ROMs during the last five to eight years. One library acquired CD-ROM within the last four years. In addition, three other HBI had acquired CD-ROM technology between the last 5-8 years. In comparison the majority of HWI (57%) had acquired CD-ROM technology more than 9 years ago.

5.1.2 CD-ROM Collection Sizes

Table 6. Number of CD-ROM Titles in the Different Libraries

Name of Library	Number of CD-ROM Titles in Collection
RAU	43
UPE	26
PUCHE	18
UDW	14
UOFS	13
VISTA	11
UNP	9
Rhodes	8
UFH	8
UND	5
UNITRA	3

The collection sizes in the different libraries varied, as can be seen in the Table above. RAU had the highest number of CD-ROM titles in its collection (43), whilst UNITRA had the lowest number of titles (3). The figures may not be an accurate representation of the CD-ROM collection sizes in the respective libraries, as one of the limitations of the study was that the survey was distributed only to main library campuses. Thus branch or departmental library collections may not be reflected.

5.1.3   Library Budget for CD-ROMs

Table 7.   Budget Allocation for CD-ROMs in the 1998 Financial Year

Response from libraries	n=11	%
Increased	3	27.3
Decreased	3	27.3
Stayed the same	2	18.2
No response	2	18.2
Did not have a budget	1	9
Total	**11**	**100**

From Table 7, it can be seen that 27.3% of the libraries indicated that their CD-ROM budget had increased, while the same percentage indicated their budget had decreased. One library indicated it did not have a budget for CD-ROMs.

5.1.4   Cancellations of Print Subscriptions to Indexes and Abstracts

Table 8.   Printed Indexes Cancelled since Acquiring CD-ROMs

Response from libraries	n=11	%
Yes	7	64
No	3	27
No response	1	9
Total	**11**	**100**

Seven or 64% of the institutions cancelled subscriptions to printed indexes since acquiring CD-ROMs. Only three libraries indicated that they had not cancelled any printed indexes.

Table 9.   Printed Abstracts Cancelled since Acquiring CD-ROMs

Response from libraries	n=11	%
Yes	8	73
No	3	27
Total	**11**	**100**

More libraries (73%) cancelled printed abstracts compared to indexes, as can be seen in Tables 8 and 9.

Table 10.   Cancellation of Journal Titles since Acquiring CD-ROMs

Response from libraries	n=11	%
Yes	6	55
No	5	45
Total	**11**	**100**

Just over half or 55% indicated that they had cancelled journal titles. The number of journal titles cancelled varied from one title in one library to about 200 titles in two libraries. At least two libraries indicated that their journal titles cancellations were not entirely or directly related to the purchase of CD-ROM titles.

5.1.5   Student and Staff access to CD-ROMs

Table 11.   Student access to CD-ROMs

Response from libraries	n=11	%
Yes	10	91
No	1	9
Total	**11**	**100**

Table 12.   Academic Staff access to CD-ROMs

Response from libraries	n=11	%
Yes	10	91
No	1	9
Total	**11**	**100**

Both students (Table 11) and academic staff (Table 12) had access to CD-ROMs in ten out of the 11 institutions. Only one institution did not provide access to CD-ROMs to either academic staff or students.

5.1.6   Networked CD-ROM Access

Table 13.   Libraries Providing Access to Networked CD-ROMs

Response from libraries	n=11	%
Yes	8	73
No	3	27
Total	**11**	**100**

The majority (73%) of libraries provided networked CD-ROM access, compared to three libraries which did not offer networked CD-ROM access. The number of

libraries indicating the management of networked CD-ROMs by different departments or persons can be seen in Table 14. Just over a third (3) of these networked CD-ROM collections were managed by the IT division of the university.

Table 14.   Management of Networked CD-ROMs

Division or Person-in-Charge	n=8
IT Division	3
Systems Librarian	2
Subject Librarian	2
Head of Information Services	1
Total	8

Some of the problems experienced with networked CD-ROMs are presented in Table 15.

Table 15.   Problems Experienced with Networked CD-ROMs

Name of University	Response Provided
RAU	Software problems. Difficult to install. Lack of accessibility through one user interface.
UPE	No problems with CD-ROM but with LAN from time to time.
PUCHE	Not many problems.
UDW	Access to CD-ROM server to users outside this library is not possible because of incompatible network protocols.
UOFS	No response.
VISTA	None with Silverplatter. NISC to upgrade on server at the various VISTA campuses.
UNP	Very few, usually configuration of the individual's PC on the LAN
Rhodes	None recently, since software upgrades on the server. Lots of downtime before this.
UFH	No response.
UND	Each time a new disc inserted, endless problems accessing them. Software has to be updated. This is not done most times. Slowness in response time when compared to stand-alone systems.
UNITRA	No response.

Problems with software were reported by at least three libraries. Other problems related to the server (3) and speed (1). Two HBI did not report any problems as they did not have networked CD-ROM services.

5.1.7   Provision of CD-ROM End-User Training

The provision of end-user training for students and academic staff in the different institutions is reflected in Tables 16 and 17.

Table 16.   CD-ROM End-User Training for Students

Response from libraries	n=11	%
Yes	9	82
No	2	18
Total	**11**	**100**

Table 17.   CD-ROM End-User Training for Academic Staff

Response from libraries	n=11	%
Yes	8	73
No	3	27
Total	**11**	**100**

Tables 16 and Table 17 indicate that end-user training was higher (82%) for students compared to 73% for academic staff in the various institutions. Two or 18% of the institutions did not offer students any form of end-user training. Three (27%) of the institutions did not offer any form of end user training for academic staff.

End-user training was done by either the subject librarians (5) or the information services librarians (4) as can be seen in Table 18.

Table 18.   Conducting CD-ROM End-User Training

Person-in-Charge	n=9
Subject Librarians	5
Information Services Librarians	4
Total	**9**

5.1.8   CD-ROM Usage: Statistical Records

Table 19.   Recording of CD-ROM Usage Statistics

Response from libraries	n=11	%
Yes	5	45
No	6	55
Total	**11**	**100**

Just over half (55%) of the libraries had no statistical records of CD-ROM usage in their libraries. Of those which indicated having records of CD-ROM usage for 1998,

only two libraries were able to provide figures. These statistics were for combined student and staff usage. The CD-ROM end-user usage ranged from 41 343 accesses in one library to 1 638 accesses in another library.

5.1.9   Popular CD-ROM Titles in Libraries

Table 20.   **Frequency of three most popular CD-ROM Titles in Libraries**

CD-ROM Title	Number of libraries
ERIC	4
PsychLit	4
Medline	3

From Table 20, it can be seen that ERIC and PsychLit formed part of the three most popular CD-ROM titles. These titles were available in four libraries.

5.1.10   CD-ROM Charging

Table 21.   **Charging for CD-ROM Usage**

Response from libraries	n=11	%
Yes	1	9
No	10	91
Total	**11**	**100**

Ten out of the 11 libraries indicated that they did not charge end-users for using CD-ROMs in their libraries. One library responded both "yes" and "no" – the "yes" referring to non-members, who were charged R50.

5.1.11 Management of CD-ROMs

Table 22. **Group or Committee Involvement in the Management of CD-ROMs**

Response from libraries	n=11	%
Yes	2	18
No	8	73
No response	1	9
Total	**11**	**100**

Only two or 18% of the libraries surveyed indicated that their CD-ROMs were managed on a "group" or committee basis. The "group" or committee in one library consisted of their information services librarians and, in the other instance, the "group" or committee was made up of IT staff. Some of the roles and responsibilities undertaken by this "group" or committee included current awareness, ordering, maintaining, cancelling of periodicals and training.

5.1.12 Internet Access in Libraries

Table 23. **Libraries having access to the Internet**

Response from libraries	n=11	%
Yes	11	100
No	0	0
Total	**11**	**100**

All libraries had access to the Internet.

5.1.13 IT Policy or Strategy in Libraries

Table 24. **Libraries having an IT Policy or Strategy**

Response from libraries	n=11	%
Yes	3	27
No	8	73
Total	**11**	**100**

Only three or 27% of the libraries had an IT policy or strategy.

5.1.14 Resource Sharing in Libraries

Table 25. Libraries Engaged in Resource Sharing

Response from libraries	n=11	%
Yes	2	18
No	9	82
Total	**11**	**100**

Nine out of the 11 libraries (82%) indicated that they were not sharing CD-ROM resources with any other libraries. Of these, six institutions indicated that they would consider CD-ROM resource sharing. Some of the comments added with regards to CD-ROM resource sharing were:

- "If costs were shared."
- "As part of a consortium."
- "Resource sharing with other libraries is the best way of utilising our resources."
- "Especially with budget constraints."
- "Licensing agreements are upgraded from LAN access to Web-access and software upgraded to give Web-access".

5.1.15 Other On-Line Database Subscriptions

Table 26. Subscriptions to Other On-Line Databases

Name of On-line Database	Number of Libraries
EbscoHost	8
Swetsnet Navigator	3
OCLC First Search	3
MCB	3
Dialog	2
Nexus	2
UNCOVER	1

Ten out of the 11 libraries indicated that, apart from SABINET, they had access to other on-line databases. One library indicated that it did not have access to any other on-line databases. The majority of the libraries had access to EbscoHost, which is provided free of charge as part of a two-year project.

5.1.16 CD-ROM Development Plans

Table 27. Library Responses to CD-ROM Development Plans

Name of University	Responses from libraries
RAU	Downloading of software and databases on hard disc.
UPE	Moving from CD-Tower to downloading CD-ROMs on network hard-drive.
PUCHE	Changing from CD-ROM access to Web access.
UDW	Intend acquiring new server to accommodate more CD-ROMs.
UOFS	Restricted by lack of funds.
VISTA	No specific plans.
UNP	On-line via the Web, provided the response time is adequate.
Rhodes	Cancellation of some CD-ROM titles in favour of on-line access.
UFH	Networking CD-ROMs.
UND	Continue subscribing to select few CD titles. Looking at reducing costs by investigating on-line databases on the Web.
UNITRA	Plan to network CD-ROMs and provide training.

CD-ROM technology is constantly changing, with developments in networking and access. Libraries were asked to indicate if they had any development plans for their CD-ROM service. All libraries responded to this question. Only VISTA had no specific CD-ROM development plans.

5.1.17 Other Comments on CD-ROM Technology

Table 28. General Comments on CD-ROM Technology

Name of University	Responses from Libraries
RAU	No response.
UPE	No response.
PUCHE	No response.
UDW	The library is constrained by the limited budget. Therefore it is unable to develop its CD-ROM services extensively.
UOFS	No response.
VISTA	Download the SilverPlatter CD-ROMs to the ERL server. Response time on the WAN is quite fast.
UNP	No response.
Rhodes	Discontinued Wilsondisc plus others due to free access on EbscoHost.
UFH	Urgently need to network our CD-ROMs.
UND	Most efficient means of searching, especially on the stand-alone system. Internet constantly marred by problems such as slowness during peak hours. Frustrating to user. But with option of full-text databases CD-ROMs may soon become a thing of the past.
UNITRA	Do not have experience regarding CD-ROM technology. Get assistance from EU which will start delivery next year. As of now, do not get any budget for books and periodicals for 1999 and 2000. Can only depend on outside funding.

Just over half or 55% of the respondents had provided additional comments about CD-ROM technology in their library.

5.2 Summary

In this chapter the findings of the study were presented in tabular format and briefly described. The collated data from the eleven libraries that responded indicated that all libraries had embraced CD-ROM technology. The collection sizes and level of CD-ROM services offered, differed in all the libraries.

Chapter Six

Discussion

6 Introduction

A discussion of the results of the survey is presented in this chapter. Some general observations based on the respondents' replies will be made first. Salient topics concerning the research objectives will be elaborated upon. The research objectives, as outlined in Chapter One, were as follows:

- To determine the extent to which South African university libraries have embraced CD-ROMs.

- To determine the level of access to CD-ROMs by students and academic staff.

- To gain insight into management issues such as budgeting, networking and end-user training.

- To determine the extent to which issues such as resource sharing, statistical records, and future developments are being addressed by the different institutions.

6.1 General Observations

All libraries had access to the Internet and e-mail. The return rate of 50% provided adequate data for discussion in the present study. There were seven responses from HWI and four responses from HBI. The following libraries from HWI responded: Rand Afrikaans University (RAU), the University of Port Elizabeth (UPE), the University of Natal, Durban (UND) and Pietermartizburg (UNP), Rhodes University (Rhodes), the University of the Orange Free State (UOFS), and Potchefstroom University for Christian Higher Education (PUCHE). The following libraries from HBI responded: the University of Fort Hare (UFH), the University of Transkei (UNITRA), the University of Durban-Westville (UDW), and VISTA University. The present study did not investigate the reasons for the poor response rates in particular. However, some of the possible reasons for the poor response rate from HBI may be

that the survey was too long and required detailed statistical data for which there were no records or the person who received the questionnaire did not act on it. Geographically, there was no response from libraries in the Western Cape, Northern Province and North-West Province. For the follow-up, the researcher did not send the questionnaires to the university librarians, as there was no response from the initial questionnaires sent to them. The researcher felt that either the information services librarian or the subject librarian would be better placed to act upon the questionnaire more quickly and expedite the return. Thus the follow-up questionnaire was addressed to appropriate individuals at the different university libraries. Respondents were able to provide input to the open-ended questions, which indicated their ability to express themselves and provide feedback on issues.

It was noted that many respondents were unable to provide statistical data for some questions such as CD-ROM usage and the number of titles cancelled for printed indexes, abstracts and journals. During analysis, the researcher was unable to use all the data from the appended table, in which respondents were asked to indicate the number of current CD-ROM subscriptions and the number of networked CD-ROM titles. Some libraries did not provide complete information in this regard. The researcher was, however, able to collate the number of CD-ROM titles held in the respective libraries.

6.2 Discussion of the Results

The survey focused on management issues related to CD-ROM technology. This includes aspects such as acquisitions, budget, access to CD-ROMs, end-user training, and networking.

6.2.1 Availability of CD-ROM in South African University Libraries

6.2.1.1 Year of CD-ROM Acquisition

The results of the survey indicated that all libraries in HWI and HBI had access to CD-ROM technology. However, the level of development in CD-ROM technology and CD-ROM services differed. This could be attributed to the years in which the different libraries acquired CD-ROMs, as shown in Table 5. Most libraries (55%) had

used CD-ROMs for between five and eight years. Four libraries in HWI had CD-ROMs for nine or more years. This is interesting to note, especially since CD-ROM has been in the marketplace for just over a decade. These libraries were early "adopters" of CD-ROM technology. They were thus able to afford and offer CD-ROM services earlier than most HBI, which acquired CD-ROMs during the last five to eight years. One HBI adopted CD-ROM technology only during the last one to four years.

6.2.1.2   Collection Sizes

Historically White Institutions (HWI) were able to start earlier with CD-ROM technology and services due to the fact that during the apartheid years there were disparities in financial resource allocation between HWI and HBI. This is clearly reflected in the collection sizes, where HWI libraries such as RAU (43), UPE (26), and PUCHE (18) had subscribed to more CD-ROM titles compared to HBI libraries such as UDW (14), VISTA (11) and UFH (8). The study also found that all the libraries in the HWI had an IT policy or strategy as compared to the libraries in HBI which had no IT policy or strategy and those which did not. Results from the present survey also indicated that there was no correlation with budget increases and decreases between libraries which had an IT policy or strategy. Responses from the different libraries were mixed as can be seen in Table 3. An IT policy or strategy however, may assist the libraries to plan CD-ROM development with regards to collection development and IT applications such as networking. The library which acquired CD-ROM technology last had the least number of CD-ROM titles. The disparities of CD-ROM collections were shown in the WGLIT (1996) report, in which it was revealed that the typical HWI had 200 titles and the typical HBI had only 44 titles. The situation has not changed at the time of the study despite various initiatives such as those of the European Union and the Ministry of Education's IT project targeted at HBI.

6.2.1.3   Budget

The collection sizes in different libraries could depend on the budget available and the collection development policy. Libraries in South Africa, too, as noted by Darch and Underwood (1999), have experienced budget cutbacks. Libraries are expected to "do more with less". Increasingly, libraries have to set aside separate budgets for the

purchase of electronic information resources, which includes paying for and maintaining subscriptions. Only two libraries, in both instances HWI, had separate CD-ROM budgets. The majority (9) indicated they did not have a separate CD-ROM budget. Of these nine libraries, three libraries had increased CD-ROM budgets and another three had had their CD-ROM budgets reduced. Six libraries indicated that they used either the journals or serials budgets to purchase CD-ROMs. Two libraries indicated they used their "library's general fund" and books and periodicals budget, respectively. One HBI indicated that it did not have a budget for journal subscriptions for 1999 and was waiting for foreign donor funding. This is in contrast to the need to "move away" from donor funding toward self-sustainability, as opined by Kanamugire (1997) in Chapter Three.

Another development in South African university libraries is the availability of EbscoHost free-of-charge, for a limited period. Even though this may seem to be a positive initiative, libraries need to think about the future once the offer ends. The question of sustaining CD-ROM services once the funding ceases will depend on whether or not libraries had planned on offering this service. The poor exchange rate of the rand is another unfavourable variable for South African libraries (Dubbeld, 1991), given that the majority of CD-ROM titles are purchased from overseas. Libraries are at present maintaining parallel collections, which means subscribing to electronic information and print resources. This can be a very costly undertaking, especially with individual printed journal subscriptions.

6.2.1.4   Cancellation of Print Subscriptions
Since many publishers are making their printed indexes, abstracts and journals available in CD-ROM format and increasingly full-text, libraries need to reconsider their subscriptions to the printed sources. Tables 8, 9 and 10 highlighted the cancellation of printed indexes, abstracts and journal titles at the different libraries. Printed indexes (7) and abstracts (8) were cancelled in more libraries, compared to journal titles (6). On the other hand, libraries were cautious in cancelling their journal titles, since some readers may still prefer to refer to the printed source and, depending on licensing agreements with different vendors, libraries may be required to return the CD-ROM titles upon cancellation of CD-ROM subscriptions. With regards to the actual number of journal titles cancelled, only two libraries provided the specific

numbers. One HBI indicated it had cancelled 200 printed journal titles but this would probably have been due largely to budget cuts rather than to subscribing to their CD-ROM counterparts. The present study did not survey whether the databases subscribed to by the respective libraries were bibliographic or full-text ones. The actual reason for cancellation to printed indexes, abstracts and journals cannot be determined in the present study. However, possible reasons for the cancellation of journal titles and printed indexes and abstracts may be related to an individual library's policy, the availability of full-text sources, budget, or on end-user requirements. To help librarians in the evaluation of databases which could aid them for the selection of CD-ROM databases, Levey, Ngwira and Patrikios (1996) provided a checklist of the criteria to be used. Another tool for assisting libraries for collection development is the recording of usage statistics, where it was noted that only two libraries had provided actual usage figures.

Individual journal title subscriptions could work out to be more expensive than opting for CD-ROM products which offer a larger number of journal titles. Many publishers are currently making their journal articles available in full-text on CD-ROM and, increasingly, on the Internet. Libraries need to determine selection and evaluation criteria, to make their collections more cost effective.

There is a paradigm shift from a "just in case" acquisition policy to "just in time" initiatives. The former focussed on the size of the collection and the repository role of the library, whereas the latter focuses on the usage of the collection and accessibility. Closely related to this is the policy of "access" and "ownership" where, in the past, libraries acquired material for their own use and provided limited access to other institutions. Resource sharing, especially among libraries in HBI, was limited. "Just in time" and "access" policies have concomitant impact on interlibrary loans and document delivery, where libraries with a larger collection of CD-ROM titles could be in a better position to offer document delivery services, particularly to libraries with inadequate collections. It was revealed in the WGLIT Report (1996) that libraries in HWI were more "lenders" of materials, compared to HBI, which were more "borrowers", because of their printed and electronic resources. The results of the present study show that libraries in HWI have larger CD-ROM collections and their role as "lenders" will still prevail.

6.2.2 Access to CD-ROMs

The extent to which South African libraries provide CD-ROM access to students and academic staff was high. Ninety-one percent of the libraries provided access to students and academic staff. Only one HBI did not provide any form of access to students and academic staff. CD-ROMs were accessible from the library and via the local area network. Only one HWI library provided access to their CD-ROM collection via the Web. Access to CD-ROMs is very important as it influences usage and impacts on service. The present study did not survey the actual forms of CD-ROM access and it is assumed that students and academic staff could either use workstations in the library or use the CD-ROM service via the local area network. Related to access and usage of CD-ROMs is the availability of workstations. Users are more likely to use CD-ROMs if there are enough workstations and do not have to wait in line or have to sign-up.

6.2.2.1   Networked CD-ROM access by students and academic Staff

The decision to network CD-ROMs as shown by Van Brakel (1991b), has implications for the library and the end-user. The main concern for the library is the management of the networked CD-ROM service, where end-user training and the added role of librarians is important. For the end-user, networked CD-ROMs increase access within the library and remotely, via the local area or wide area network.

In Table 14, it can be seen that different people in different institutions managed the CD-ROM network. They varied from the IT division of the university to the subject and systems librarians. This shows that the networked CD-ROMs could be located in the library or outside the library, for example, at the computing centre. Some libraries with developed IT infrastructures offer converged services, where library and computing services are managed by one unit, sometimes known generically as academic information services. In converged services, libraries need to define their roles clearly with regards to budget and end-user support. Issues such as maintaining the system, updating software, troubleshooting, offering helpdesk services and end-user training must be considered during the planning stages.

The findings of the present study indicated that libraries experienced problems with networked CD-ROMs. These included, amongst others, updating and installation of the software and problems with the local area network and the server. In the literature

review, Phiri (1993) pointed out that libraries sometimes do not have the technical expertise and qualified professionals to manage CD-ROM services.

6.2.3 End-User Training

In addition to all staff knowing how to use CD-ROM technology and the different products themselves, staff are expected to train end-users. The level of CD-ROM end-user training by South African university libraries was very high. Most libraries provided end-user training to academic staff and students. Table 16 and Table 17, respectively show that more libraries offered end-user training to students (87%) compared to academic staff (73%). All HWI offered end-user training to students. This took the form of class groups, one-on-one training and on-demand sessions. End-user training for academic staff varied from on-demand training, regular voluntary workshops, departmental training and one-on-one training during sign-ons. One institution noted that most staff were computer literate and experimented on their own, with few problems. Five libraries in HBI and HWI indicated that subject librarians conducted end-user training.

Geldenhuys (1995) notes the changing role of library staff from an intermediary role to advisor or trainer. "A greater awareness of the training needs of users and the need for information literate users has increased the training component of the workload of staff tremendously- hence the need for a structured training package to reach the greatest number of users in the shortest time possible" (Geldenhuys, 1995: 369). Van Brakel (1991b) advised that

> planning for a user education programme in this area should start with a thorough situation analysis of what is available, the costs involved, defining the client's needs, and determining how the identified sources can be used to fulfil those needs effectively. Consideration of these factors should result in guidelines which will assist in planning the didactics of specific courses, for example, classroom instruction, tutorials, point-of-use instruction and CAI lessons.

Librarians working with CD-ROMs need to know the coverage of the different CD-ROM products so as to design courses and programmes for the respective end-users. Flexibility and creativity will be needed to promote and market the CD-ROMs to end-users. Planning, delivering and evaluating an end-user training programme can be

time-consuming, especially when this becomes an on-going event over and above regular duties.

6.2.4 CD-ROM Usage Statistics

Only five libraries, of which all were from HWI, had maintained statistical records on the usage of their CD-ROM services (Table 19). Two of the five libraries were able to provide actual figures. Statistics in these libraries were for combined student and academic staff usage. One library had a usage statistic of 41 343 – a much higher usage than the second library, in which the CD-ROM facility was used 1 638 times. It is interesting to note that these two libraries were part of the top three libraries with the largest number of CD-ROM titles. The library having the most number of CD-ROM titles (43) did not provide any figures. However, it did state that it kept statistics for academic staff and students together, rather than separate figures. Statistics were recorded on a monthly basis. The high usage in these libraries could be a result of effective marketing and promotions and end-user training programmes. None of the HBI was able to provide any data on CD-ROM usage statistics in their libraries. Recording of statistics allows libraries to indicate usage of the CD-ROM service, which can then be used to justify the continuation or termination of the service or product. The present study indicates that this has not been actively done by all libraries. Libraries, on the other hand, were able to indicate the three most popular CD-ROM titles used in their respective libraries (Table 20).

6.2.4.1   Popular CD-ROM Titles in Libraries

CD-ROMs in the social sciences, namely education and psychology, were the most popular titles in libraries, as noted in Table 20. Geldenhuys (1995) found in her study that interdisciplinary databases were most heavily used and these included ERIC. It can be noted from Table 20 that the most popular CD-ROMs were international titles. The need for CD-ROMs with local content was stressed by Kanagumire (1997). Local CD-ROM titles did not appear to be heavily used. In order to increase usage, librarians need to consider promotional and marketing activities. Programmes such as user-education can help increase awareness and increase usage.

6.2.5 Charging

Only one library indicated that it charged for its CD-ROM usage and this charge was levied against non-members of the library (Table 21). Most libraries (10) did not charge end-users for their CD-ROM usage. Van Brakel (1991b) noted that CD-ROM costs need to be determined and recovered. He noted that

> It is essential that each organisation establish the exact cost figures before embarking on an extensive CD-ROM buying policy. The following list may assist in such a venture:
> - Initial hardware and software costs (existing workstations must normally be upgraded, for example, with a driver card, driver software, high resolution screen; additional RAM and hard-disc storage);
> - Initial and running costs for CD-ROM databases (one copy must be acquired for each system to be installed);
> - Queuing problems (a high demand will require that duplicate copies of a specific title be purchased);
> - Hardware maintenance and replacement (a local network may eventually be the only viable economical step to take);
> - Staff assistance (a very expensive commodity);
> - Communication and database charges when searching an on-line host for the updated part of the database.

CD-ROM services include stationery costs, such as paper for printouts of searches on CD-ROMs. While charging for CD-ROM usage is being avoided by the vast majority of libraries in the study, it may well be a policy issue that individual libraries will have to confront in the future, especially with the rising costs of electronic information resources and their use.

6.2.6 Managing the CD-ROMs

Only two libraries indicated that their CD-ROM service was managed by a committee or on a "group" basis (Table 22). These were responses from HWI. The "group" or committee in one library consisted of information services librarians, and in the other instance the "group" or committee was made up of IT staff and information services librarians. The two libraries had 26 and eight CD-ROM titles, respectively. Some of the roles and responsibilities undertaken by this "group" or committee included current awareness, ordering, maintaining, cancelling and training. In order to evaluate, sustain and monitor CD-ROM services, libraries need to establish a "user group" to investigate these areas. It is noteworthy that in one library the "group" or committee comprised of IT staff and information services librarians. The CD-ROM service is

made up of technical issues such as networking and information-related issues such as end-user services. A well-represented "user group" will ensure that all aspects of the CD-ROM service is taken into consideration. This "group" or committee could contribute towards the development of the library's IT policy or strategy, especially since presumably having had experience with CD-ROM technology. Only three libraries, of which all were from HWI, indicated that they had an IT policy or strategy. Libraries need to develop IT policies or strategies, considering the evolving nature of library technologies such as CD-ROM. An IT policy or strategy be it a short- or long-term one, provides direction for the institution and allows for better resource allocation, both human and financial. Furthermore, institutions can develop IT plans or strategies and use them as proposals for fund-raising.

6.2.7 Resource Sharing

The question on resource sharing received mixed responses (Table 25). Two HWI were engaged in CD-ROM resource sharing with another library. One of these institutions had the second largest number of CD-ROM titles (29), whilst the other library had nine titles. The purpose for resource sharing in the different libraries varied from sharing costs and utilising resources to technical issues such as licensing agreements to offer Web-access. All but one HBI indicated their willingness to participate in CD-ROM resource sharing. One library indicated that it would participate in resource sharing as part of a consortium. The formation of consortia can have benefits for libraries if they are well planned. Resource sharing requires an adequate infrastructure. There are a number of university libraries in South Africa, notably from HBI, that are located in rural areas and, in most instances resource sharing is technology dependent. University libraries participating in consortiums such as GAELIC and CALICO (see Chapter Three) are mainly located in urban areas and have the appropriate infrastructure. Thus not all libraries may be willing to participate in resource sharing if the initiative did not have any benefits for their own library.

Another conduit for resource sharing could be the use of e-mail and the Internet. The present study noted that all libraries had access to e-mail and the Internet. Even though the Internet infrastructure may still be developing, universities should see this

as a great potential for teaching and learning. As indicated earlier in the discussion, CD-ROM publishers are making more of their products available via the Web and CD-ROM technology is migrating towards Web-based services. Libraries in South Africa, especially from the HWI, are looking at the Web for on-line information sources.

6.2.8 Other On-line Database Subscriptions

Webb (1998) noted that libraries could increase their electronic resources by making use of services provided by information "aggregators".

> Aggregators combine electronic resources from disparate suppliers or locations into larger resource units for users. While most aggregators are third-party vendors (UMI, IAC, Ebsco, SilverPlatter, OCLC, CARL, Blackwell, Elsevier/CIS, to name just a few) that combine the offerings of multiple publishers, some such as IDEAL from Academic Press aggregate the publisher's own electronic journals into a single package. The most common resources in an aggregator's package are electronic journals or the articles from current journals, but resources may include legal resources, financial reports, and government documents.

The majority of libraries (10) were offering at least one other on-line database in addition to the South African Bibliographic and Information Network (SABINET). Eight libraries were offering EbscoHost. This was a sponsored service available free-of-charge for two years as part of the Electronic Information For Libraries Direct (EIFL Direct), Ebsco Publishing and Open Society Institute of South Africa alliance. This consortium provides public and academic libraries in South Africa with a variety of full-text, reference databases (Ebsco Press Release, 1999). Additional on-line services offered by other libraries included Swetsnet Navigator, OCLC First Search, Dialog and UNCOVER.

All libraries have access to the South African Bibliographic and Information Network (SABINET) and all but one have access to additional on-line databases, in addition to their CD-ROM collections. This indicates that South African university libraries are making use of aggregator services to provide more electronic information resources. This could be the reason for the lower number of individual CD-ROM titles being subscribed to.

6.2.9 CD-ROM Development Plans

The evolving nature of CD-ROM technology requires libraries to think ahead and plan for the development of CD-ROM services. Apart from one library, all the libraries indicated some future plans for their CD-ROM service (Table 27). The responses provided a cross-section of levels of CD-ROM development in HBI and HWI. Historically Black Institutions (HBI), which had, in general a smaller collection of titles and less developed infrastructure, revealed plans to network CD-ROMs, provide training and acquire a new server. The two libraries from the HWI which indicated that they possessed the highest number of CD-ROM titles (Table 6) had plans to download software and databases onto the hard disc. This allows users to have faster access to databases and updated information. Four libraries said they would use the Web for providing on-line access in the future. These responses provide a comparative indication of the levels of CD-ROM technology development, where HBI are looking at networking and server issues and HWI are investigating advanced developments such as data management and Web access. The different levels of development will in a sense be useful, as they will allow HBI to refer to HWI for "best practice" models and possible problems to be faced when implementing their own service.

Six libraries provided general comments about their own CD-ROM technology (Table 28). All four HBI provided comments which highlight some of the CD-ROM issues and challenges in their libraries. The HBI, which had acquired CD-ROM technology between the last one to four years and had the least number of CD-ROM titles, indicated that they had no experience with CD-ROM technology. One library identified the Web as a possible delivery mechanism for on-line databases, but cautioned about the slowness of the Internet during peak hours. As more information becomes accessible via the Web, the problems of networking CD-ROMs can be reduced. In the literature review, Zulu (1994) and Phiri (1993) complained that poor telecommunications linkages were major problems in African libraries when access to on-line databases is sought. Similarly, some university libraries in South Africa are experiencing telecommunication and infrastructure problems with Web access.

6.3 Summary

The results of the present study were discussed and elaborated upon. A general observation was the number of responses from HBI and HWI institutions. The different aspects of CD-ROM technology in the different libraries were discussed. Where appropriate, comparisons between HBI and HWI were made. It was noted that all libraries have acquired CD-ROM technology. However, each library was at a different stage of development, with such technology being less developed in terms of collection development and networking at HBI.

Chapter Seven

Conclusion

7   Introduction

In this chapter a brief summary of the study will be presented. Conclusions from the findings, as discussed in Chapter Six, will be drawn. This will be followed by suggestions (see 7.3) for further research.

7.1   Summary

The aim of the study was to determine the status of CD-ROM technology in university libraries in South Africa. It was clear that libraries in South Africa were characterised into Historically White Institutions (HWI) and Historically Black Institutions (HBI), where the former served the White population and the latter served the Black population. Libraries in HWI, as noted in the WGLIT Report (1996), were well-resourced and well-financed compared to libraries in HBI. Bearing this in mind, the researcher undertook a study of all university libraries in South Africa.

CD-ROMs are part of ICT and are sometimes categorised as electronic information service or networked information resources. CD-ROMs are expensive to acquire, maintain and sustain. The study was undertaken because the researcher felt that there was an information gap concerning this topic. Previous studies were limited to specific institutions and did not provide a holistic representation of all university libraries and their efforts to manage CD-ROM technology and services. The present study provides data on issues and challenges facing libraries that have acquired CD-ROM technology globally. It is of use to anyone wanting current data on management issues such as collections and budgets, networked CD-ROMs and end-user training. The study focussed on management issues related to CD-ROM technology and did not cover technical aspects.

The introduction in Chapter One provided a background to the present study and contextualised the research. The problem statement, aim and objectives of the study were expanded upon. Definitions of terms used in the study were given. The limitations and significance of the study were covered in Chapter One. It was pointed out that providing a CD-ROM service needs to be carefully planned, as it affects staff, users and services. It was shown that end-users, who include students and academic staff in university libraries, are becoming aware of the new media and IT in general. South African university libraries, are responding to this demand and, to an increasing extent HWI and HBI offer IT-based services. However, these libraries are facing financial cutbacks and have to "do more with less".

CD-ROM technology incorporates the use of optical discs. Chapter Two provided an overview of CD-ROM technology. The advantages and disadvantages of CD-ROM technology were explained. CD-ROM applications to library and information services were outlined. The transient nature of the technology was stressed in trends and developments. The question whether or not CD-ROM is the "medium of the moment" was presented in a discussion on the emerging DVD-ROM market.

Chapter Three reviewed the literature related to this study. It was established that there is a wealth of information sources on this topic. Studies from the USA and UK included surveys of academic libraries. These studies provided the researcher with a conceptual framework for the design of the present study. The researcher acknowledged published topics on CD-ROM technology in South African universities. However, nothing directly relevant to the present study was found in the literature. The chapter discussed the various management topics examined in the study, which were supported by the literature from mostly "African" sources. Where possible, reference to the wider international literature was made.

The focus of Chapter Four was on the methodology employed in the present study. The assessment method and data collection technique used were the survey and the questionnaire, respectively. The instrument used was the questionnaire. The researcher made use of an e-mail questionnaire. A detailed discussion of the use of e-mail to distribute and collect data was provided. The proliferation of e-mail was noted and its potential as a research tool was emphasized. The advantages and

disadvantages of e-mail for collecting data were presented. The study highlighted that e-mail can be used to collect data since the majority of the libraries were able to complete the questionnaire electronically. However, the actual efficiency in the use of e-mail to collect data in areas such as response times and collation of data was elaborated upon in the present study. The concepts of "validity" and "reliability" were explained, followed by a brief outline of how the data was analysed.

Chapter Five was a presentation of the results of the survey in tabular format.

The survey results were discussed in Chapter Six.

7.2   Conclusions

7.2.1   Proliferation of CD-ROMs in South African University Libraries

The aim of the study was to determine the extent to which South African university libraries had embraced CD-ROM technology. CD-ROM, like other ICT technologies, is constantly changing and the greatest challenge facing libraries is how to keep up with the technology. Moreover, there are management challenges that are faced by university libraries in the provision of CD-ROM services. These include embracing IT, providing electronic information services, library staff training and development.

As observed in Chapter Five, CD-ROMs have proliferated in South African university libraries and university libraries have embraced CD-ROM technology as part of their service to their students and their academic staff. The study found that HBI and HWI institutions have CD-ROM technology, albeit at different levels of technological and service development. Differences in collection sizes and implementation of networked CD-ROM services could be attributed to the disparities which characterised educational institutions in the apartheid era. The acquisition of CD-ROM technology is the first step towards providing networked electronic library services and some South African university libraries have already taken this step. Other libraries, notably the HBI, having acquired CD-ROM technology, are considering providing networked electronic information services.

7.2.2 Resource Sharing and the formation of Consortia

Most South African university libraries are experiencing budget shortages and cutbacks. To address this issue, university libraries are looking at their collections and cancelling their subscriptions to duplicate titles of printed indexes and abstracts. Cancellations of journal titles, on the other hand, are more selective. Libraries are maintaining parallel print and electronic resources. Libraries are offering their students and academic staff additional on-line databases. While the international trend in academic libraries is towards digital and virtual libraries, South African university libraries are still hybrid in nature. Consortia can be used to optimise resource sharing. Resource sharing is not necessarily a cost-saving venture, however. University libraries, from HBI and HWI, together with technikon libraries, have begun forming consortiums to solve the increasing problem of budgets for the acquisition of electronic information resources. Full co-operation and participation can be achieved with documented commitment from the different institutions. Best-practice models and benchmarks can be obtained from other libraries, worldwide. However, considerable adjustment will be needed for the South African scenario.

The paradigm shift from libraries having an "ownership" policy toward "access" has resulted in libraries providing a "just in time" service rather than a "just in case" approach. Libraries in HBI and HWI are realising that they are able to offer more resources and services collectively than they could on their own. The level of resource sharing may vary from library to library. Some libraries may have unique collections or comprehensive collections in subject areas for example the University of Fort Hare library has the liberation movement archives and the University of Durban-Westville have the Indian Documentation Centre. Other libraries such as Rand Afrikaans University and University of Port Elizabeth may have staff trained in IT skills. In this way libraries will see the benefit of wanting to participate in resource sharing by creating a "win-win" situation. The present study has shown that most libraries were willing to participate in resource sharing and consortium initiatives. This will help HBI to improve their service and they would be able to tap into virtual libraries of participating libraries in the consortium. All libraries should plan a strategy which allows all members of the consortium to benefit by their membership. This can take the form of service-level agreements or a memorandum of understanding.

7.2.3 Web-based Services

The extent to which South African libraries are keeping up with developments in CD-ROM technology was discussed. Some libraries have already-functional CD-ROM services delivered over their local and wide area networks.

Historically White Institutions have discovered the limitations of networking CD-ROMs and are looking at the possibility of providing on-line information resources via the Web. Even though the Internet infrastructure is still limited in its broadband capabilities to offer services such as CD-ROM on demand and complete digital or virtual libraries, the possibility of the Web as a future conduit of an information delivery system is being investigated by, notably, HWI. Historically Black Institutions needing advice on networking and other technological matters can look to some HWI, which are migrating their CD-ROM services. Most South African university libraries do not have an IT policy or strategy. Strategic planning needs to be undertaken in which libraries are able to project or forecast the development of their services. This need becomes even greater with more libraries moving towards the provision of electronic information resources. Libraries may want to consider re-engineering their services and re-examining their policies, should they have one, to become more project-based, as this can result in more cost-effective services.

7.2.4 End-User Training

The need to create a critical mass of users of CD-ROM services is being addressed by South African university libraries. This is evident in the efforts of the libraries which are providing end-user education programmes to students and academic staff. The need to promote and market CD-ROM services to end-users can be done in more creative ways such as using e-mail and the Internet to provide instruction and carry out surveys. Subject and information service librarians in South African university libraries offer end-user training programmes, but constant evaluation of these programmes needs to be made. Very few libraries keep a record of CD-ROM usage statistics. Statistical records can be used for knowledge management, where data can be used to compartmentalise the user groups, identify information-seeking behaviours, publish research findings in the literature and influence management for decision-making purposes.

7.2.5 Informed Decision-Making

Academic libraries worldwide are adopting a "wait and see" attitude to the future of CD-ROM technology as noted in the literature. The opinion of Breeding (1999) was that the demise of the CD-ROM is not in sight, with the growth of the Internet, and that the CD-ROM is now an end-user medium with the focus on its storage capacity. In order to stay up-to-date with CD-ROM technology and developments, libraries should concentrate on the content of information products. Whilst aggregators and vendors vie for the best content from publishers, libraries and librarians should start creating the best information infrastructures for IT applications and services. It becomes important for libraries and librarians to be aware of industry trends and to be able to make informed decisions when seeking electronic information resources. It is for this reason that the university library, together with other parties such as the computing centre and users of the service, should liaise to form a user group or committee to strategise the evolution of CD-ROM services in an increasingly Web-based environment.

7.3   Suggestions for Further Research

7.3.1   The WGLIT Report (1996) is a useful document which provided the *status quo* of libraries in HWI and HBI. The extent to which the different areas examined in the WGLIT Report and the recommendations made by the working group are being addressed and are receiving attention will be useful for libraries planning services for the 21st century. Very often, locating up-to-date information on all university libraries is difficult. A market report with innovative case studies of different libraries and the documentation of success stories will provide library managers and planners with a new perspective on the provision of CD-ROM services in university libraries in a post-apartheid South Africa.

7.3.2   Some South African university libraries are already looking to the Web for the provision of electronic information. However, to deliver an effective Web-based information service, libraries will need to conduct a feasibility study. The provision of Web-based electronic information services is frequently unplanned and haphazard. An audit of existing infrastructures and the potential types of information services to be delivered via the Web will be useful to all South African libraries.

7.3.3   The compilation of a directory of CD-ROM titles in South African university libraries will be useful for all libraries in South Africa. This directory could contain useful information such as vendor name, years of coverage and type of database. This would assist in resource sharing such as inter-library loans and acquisitions. Libraries are often unaware of CD-ROM titles in other libraries.

7.3.4   University libraries in South Africa have adopted ICT applications related to information storage, retrieval and dissemination. Research into the extent to which ICT applications have impacted on organisational structure and services will assist all types of libraries embarking on such projects. A study of librarian's use and attitudes towards ICT applications will help analyse the need for staff training and development.

7.3.4   A study of end-user preferences for CD-ROM services needs to be undertaken, especially since end-users are now becoming more informed concerning the different information resources and their formats. This will indicate the extent to which the Internet and traditional library services are being used.

7.3.5   Finally, studies in CD-ROM usage can be conducted. The results can be used for planning and funding proposals.

7.4   Concluding Remarks

All the university libraries which participated in the present study have embraced CD-ROM services. Both HBI and HWI are facing challenges in sustaining their respective CD-ROM services. This is because of the transient nature of CD-ROM technology. All the university libraries have transcended traditional print-based collections and services toward wanting to offer electronic information services. While the Web offers great potential for South African university libraries, the extent to which technology is driving the service warrants caution, as providing technology-based services is not a once-off investment. Factors such as sustainability and training for library staff and end-users must be considered. For now, South African university libraries, like many university and other libraries worldwide, are hybrid in nature, offering printed and electronic information resources and they thus offer the end-user a choice.

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Appendix A

Dear

In partial fulfilment of my Masters degree in Information Studies, being pursued via distance education at the University of Natal, Pietermaritzburg, I am conducting a survey of Compact Disc Read Only Memory (CD-ROM) technology in South African university libraries.

I hereby seek your kind co-operation in eliciting data about CD-ROMs in your library. It will be appreciated if you could please complete the e-mail survey. As part of my methodology, I am researching e-mail as a survey distribution technique, thus I would appreciate it if your replies were returned via e-mail.

The questionnaire is attached as a Microsoft Word 95 document. You may want to follow these steps to complete the survey electronically:

Step 1   Open the attached Microsoft Word file (you may want to save it on disc)

Step 2   Input the data on the questionnaire

Step 3   Save the document

Step 4   Attach the completed survey as an e-mail attachment to:

rajendra_munoo@nlb.gov.sg

Step 5   If you experience any problems in extracting the file or completing the questions, please do not hesitate to contact me.

Alternatively, if you have problems completing the questionnaire electronically, please post it to the address below or fax your response to: 65 + 337 1470

I value your time and response as your participation will bring to the fore the status of CD-ROMs in South African university libraries.

Thanking you in advance.

Yours faithfully

Rajen Munoo

Reference Librarian

National Library

91 Stamford Road

Singapore, 178896

Appendix B

Questionnaire to University Libraries

Topic: A Survey of Compact Disc Read Only Memory (CD-ROM) Technology in South African University Libraries

Questionnaire Objectives
1   To elicit information on the present state of CD-ROM technology in your library with specific reference to subscriptions and collection, budget, access, and end user training.
2   To address general issues related to the developments of CD-ROM technology in your library.

Definition of Terms
1   CD-ROM does not refer to one-off titles e.g. Microsoft Dogs or unplanned acquisitions such as single title gifts.
2   Library refers to the Main Library and not branch or departmental libraries.

Instructions
1   Please place a cross [X] in the spaces where required.
2   Please input data in the blank spaces provided.
3   Please answer the questions as completely as possible.

A   Institutional Information

1   Name of University:

B   Subscriptions and Collections

2   Does your library have CD-ROMs (please see definition of term above) in its collection?
      Yes   [ ]   Please go to Question 3
      No   [ ]   Please go to Question 2.1

2.1   If No, do you anticipate acquiring CD-ROMs in the near future?
      Yes   [ ]   Please go to Questions 20 to 23
      No   [ ]   Please go to Questions 19, 21, 22 and 23

3   When did your library first acquire CD-ROMs specifically for use?
      less than a year ago   [ ]
      1-4 years ago   [ ]
      5-8 years ago   [ ]
      more than 9 years ago   [ ]

4   In order to establish what your CD-ROM collection comprises, please complete the attached tabular form (**Appendix 1**) by listing the CD-ROMs titles in your library and filling in other necessary information.

C   Budget

5   Does your library have a separate CD-ROM budget for purchases?
       Yes   [ ]   Please go to Question 6
       No   [ ]   Please go to Question 5.1

5.1   If No, what is your source of funding for the purchase of CD-ROMs?

6   Please indicate whether the CD-ROM budget in the last financial year has increased, decreased, or stayed the same in real terms:
       increased   [ ]
       decreased   [ ]
       stayed the same   [ ]

7   Since acquiring CD-ROMs has your library cancelled any print subscriptions to:

       7.1 Indexes
       Yes   [ ]
       No   [ ]
       If Yes, how many titles

       7.2 Abstracts
       Yes   [ ]
       No   [ ]
       If Yes, how many titles

       7.3 Journals
       Yes   [ ]
       No   [ ]
       If Yes, how many titles

D   Access to CD-ROMs

8   Do students have access to CD-ROMs?
       Yes   [ ]   Please go to Question 8.1
       No   [ ]

8.1.   If Yes, where do they access it from (you may give more than one answer):
       come into the library   [ ]
       remotely via the local area network   [ ]
       other   [ ] Please specify

9   Do academic staff have access to CD-ROMs?
       Yes   [ ]   Please go to Question 9.1
       No   [ ]

9.1   If Yes, where do they access it from (you may give more than one answer):
       come into the library   [ ]
       remotely via the local area network   [ ]
       other   [ ] Please specify

10   Does your library provide networked CD-ROM access?
       Yes   [ ]
       No   [ ]   Please go to Question 13

11   Who manages the networked CD-ROMs?

12   What problems if any, do you experience with networked CD-ROMs?

E   End User Training

13   Do you provide any CD-ROM end user training for:

13.1   Students
        Yes   [ ]
        No   [ ]
        If Yes, please describe briefly

13.2   Academic Staff
        Yes   [ ]
        No   [ ]
        If Yes, please describe briefly

14   Who conducts the end user training programmes?

F   Management of CD-ROMs

15   Do you keep statistics on CD-ROM usage in your library?
        Yes   [ ]
        No   [ ]   Please go to Question 16

15.1   If Yes, do you have any statistics relating to CD-ROM usage for 1998 (e.g. the
        number of times the CD-ROMs were used by either academic staff or students or
        both)?
        Yes   [ ]   Please go to Question 15.2
        No   [ ]

15.2   If Yes, please could you **BRIEFLY** describe these statistics for
15.2.1 Students

15.2.2 Academic Staff

16   What are your three (3) most used CD-ROMs? Please provide the titles in order of
        usage (with 1 being most used)
1
2
3

17   Do you charge end users for using CD-ROMs?
        Yes   [ ]   Please go to Question 17.1
        No   [ ]

17.1   If Yes, please state who it is you charge and what the charges are?

18   Is the management of CD-ROMs in your library done on a "group basis" e.g. a committee?
        Yes   [ ]   Please go to Question 18.1, 18.2 and 18.3
        No   [ ]

18.1   Please state who comprises the group (e.g. librarians, academics, IT people, students)

18.2   Please briefly describe the function of this group

G   Resource Sharing

19   Is your library presently sharing CD-ROM resources with any other library?
        Yes   [ ]
        No   [ ]   Please go to Question 19.1

19.1   If No, would your library consider CD-ROM resource sharing with other libraries in the region?

H   General

20   What are your plans, if any, for the next phase of CD-ROM development in your library?

21   Apart from SABINET, which other on-line databases does your library subscribe to?

22   Does your library have access to the Internet?
        Yes   [ ]
        No   [ ]

23   Does your library have an IT policy or strategy?
        Yes   [ ]
        No   [ ]

24   Any other comments you would like to make concerning CD-ROM technology in your library?

Thank You for Your Valuable Time. Should you be interested in the results of this survey, please e-mail rajendra_munoo@nlb.gov.sg

Appendix 1

Instructions

1   Please place a cross [X] next to the categories where appropriate.
2   Please input additional titles if required. (These are just some sample titles)

Titles	In Collection		Subscription		Networked	
	Yes	No	Current	Discontinued	Yes	No
ABI Inform						
Art Index						
ATLA Religion Database						
Book Review Digest						
Bookfind World Edition						
Butterworths Constitutional Law						
Butterworth's Law of South Africa						
Butterworths Statutes of South Africa						
BIOSIS						
Butterworth's Tax Library						
Books In Print						
Business Periodicals Index						
CAB Abstracts						
EconLit						
Education Index						
ERIC						
General Science Index						
Inspec						
Jutastat						
Library Literature						
MLA International Bibliography						
MEDLINE						
PsycLit						
Reader's Guide Abstracts						
Science Citation Index						
Serials Directory						
Social Sciences Citation Index						
South African Law Reports						
Wilson Business Abstracts						