IN-HOUSE INDEXING OF PERIODICAL LITERATURE: A STUDY OF UNIVERSITY LIBRARIES IN KENYA

By

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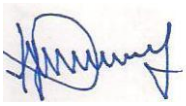
DECLARATION

I declare that

The study *In-house indexing of periodical literature: a study of university libraries in Kenya* is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references.

Signed:  22nd March, 2012

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As the candidate's supervisors, we have approved this thesis for submission

Signed: 25 March 2012

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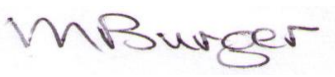

Signed: 25 March 2012

MRS M. BURGER Date

(Co-Promoter)

DEDICATION

With love,

This work is dedicated to my wife Lynnette

Your love, patience, support and encouragement have been the source of my inspiration

And in the memory of my late Father Rev. Hezron Marisia and the late mother Margaret

Lumiti Marisia who always encouraged me to keep adding to my knowledge whenever

I had the opportunity

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To God be the Glory for great things He has done.

MAY GOD BLESS YOU ALL

ABSTRACT

The present study investigated identification, access and usage of periodicals in university libraries in Kenya, with a view of recommending a tool for assisting users to identify information. Using questionnaires completed by 316 university library users and 27 librarians, backed with participant observations, document analysis as well as interviews, it was found that usage of periodicals was low as most users browse through periodicals to identify information, a method that is not effective. In-house indexing was investigated and found to be an effective tool in facilitating access to relevant information. *The study recommends establishment of in-house indexing programs and databases in university libraries; formulation of consistent indexing policies to achieve quality indexing; and that indexing should be focused on both content and user requirements by specifying points- of- view, and study methodologies to enhance retrieval of relevant information.*

Keywords

In-house indexing; University libraries; Periodicals indexing; Indexing; Information processing; Access to information; Periodical literature.

DEFINITION OF TERMS

This study accepts and adopts the standard definition of terms as they are presented in key authority sources (e.g. dictionaries, encyclopedias, etc).

Bibliographic apparatus

Bibliographic apparatus refer to: title, subtitle, abstract, paragraph headings, and initial paragraphs.

Compound subject

A compound subject refers to a text with more than one central concept.

Explicit subject Information

Information which is expressed in the terminology applied by the document producer.

Implicit information

Information which is not directly expressed by the author but which is readily understood or interpreted by a (human) reader of the document.

Index Term

The verbal representation of a concept. A term may consist of one word (e.g. globalization) or more words (e.g. stock markets). Index terms are used for retrieving the documents described. Index terms are also known as descriptors.

Indexer

Anyone (e.g. cataloguer, indexer, classifier) who would be doing subject organization (i.e., analyzing the subject of an item, describing the subject in his/her terms, and translating it into a specific system's language).

Indexing

The process of creating subject data, i.e. subject entries or descriptors for documents in an information retrieval system.

Indexing consistency

A measure of the similarity of different human beings processing the same information.

Indexing consistency in a group of indexers

The degree of agreement in the representation of the essential information of the document by certain sets of indexing terms selected independently by each of the indexers in the group.

In-house indexing

The process of assigning subjects/terms to articles or contributions in periodicals held in the library or information center by the holding library or information center, aimed at assisting library users to quickly locate relevant information contained in the indexed works.

Inter indexer consistency

The extent to which two or more people agree in their description of a body of information. It refers to the phenomenon of conflicting indexer decisions. If several different indexers are asked independently and individually to index the same document, a great deal of inconsistency is likely to be apparent in the results. In other words, the judgment and selection of terms to represent the subjects of the document will vary considerably from indexer to indexer.

Periodical publication

A publication that comes out periodically at regular intervals in a definite sequence without a foreseen end, usually containing information that depicts on the state of the art. Also known as serial publication.

Precision

The capacity of the system to withhold non-relevant documents.

Precision ratio

The number of relevant documents out of the total number of documents retrieved by the index.

Reading

To an extent which varies with length and importance of text, and the time available, reading means mentally incorporating the structure and content of a text not in and for itself, but as it is of value to the user of the text base.

Recall

Recall is the retrieval of relevant documents by the system as a result of a search inquiry.

Recall ratio

The number of relevant documents among the total relevant documents which has been retrieved by the indexing system.

Search Strategy

The formulation of a statement of the user's information need in a formula appropriate to a retrieval system.

Subject

The totality of epistemological interests that one document may serve.

Subject analysis

Deriving from a document a set of words that serve as a condensed representation of it. This representation may be used to identify the document, to provide access points in literature searches, to indicate its content, or as a substitute for the document. Also known as conceptual analysis.

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CHAPTER 1

INTRODUCTION AND BACKGROUND TO THE STUDY

1.1 BACKGROUND TO THE STUDY AND CONTEXTUAL SETTING

The world's scholarly community is presently generating a flood of periodical literature courtesy of the technological advancement and a growing need for information for decision-making, research and development. This is witnessed in libraries that have over the years collected large volumes of periodical publications to meet the varying needs of their clientele. Periodicals play a critical role in universities since they convey the most up-to-date information on developments in the users' areas of expertise. Universities that are strong in research spend colossal sums of money on periodicals. More importantly, periodicals constitute the heart of academic research in universities. The importance of periodicals in university libraries cannot therefore be overemphasised.

Ideally, one needs a good comprehensive index, abstract or citation to be able to identify relevant information contained in large periodical collections, typical of what university libraries hold. Today's abstracting and indexing services had their beginnings in the nineteenth century when periodical publishing exploded and the need for access to wealth of information in these publications increased (Mark & Tarulla 1990:223).

Unfortunately, only a fraction of the literature is covered by most existing indexing, abstracting or citation services. Lack of exhaustive coverage by indexing services was observed several years ago (Pollard 1942; Verner 1952; Bourne 1962). Examples of the literature in science and technology which was relatively unknown for generations due to lack of indexing, were cited in Pollard (1942:41). There continued to be a problem of inadequate coverage although indexes had existed for over 300 years (Verner 1954:509). According to Bourne (1962:159), some of the periodical literature was over the years considered as rehashes, popularised writings or trivial contributions and therefore not covered by indexing and abstracting services.

To date, some of the major services do not cover periodicals from certain regions in a timely and comprehensive manner. According to Polman (1998:401) quite a few links to resources listed by *Index of Africa* on Africa-related Internet sources have been found to be obsolete and in some cases missing altogether. An evaluation of 13 scholarly African American studies journals by several relevant electronic indexing services (both titles and level of coverage), established that indexing in this interdisciplinary field is inadequate and that no service provides comprehensive coverage of the titles (Pillow 1999:21).

There is evidence in the literature that suggests that some publishers of periodical indexes do not employ qualified indexers while others compile poor machine-generated indexes. Wellisch (1994:624) laments thus:

> Regrettably, only relatively few periodicals even quite prestigious ones, provide their users with good professionally compiled indexes. Even worse, many journals provide only author indexes which can easily be compiled without any human intervention from machine-readable text, while others rely on simplistic keyword indexes generated automatically from titles to save costs. Yet others leave the compilation of subject indexes to semi-literate junior staff members, while many periodicals remain without any index at all.

The problem of access to periodical literature has been further aggravated by rising subscription costs to periodicals which has led to widening gaps in periodical holdings in most libraries. Very few libraries are renewing their subscriptions, very few can afford to renew subscription to indexing and abstracting journals and very few can afford to subscribe to online indexing databases. Librarians have been complaining about outrageous journal prices for years and have continued to cancel journal subscriptions (Martin 1999:223).

Literature in the area suggests that there have been marked cancellations of periodical subscriptions including indexing and abstracting services, as costs continue to escalate (King & Tenopir 2000; Rogers & Oder 2000; Enssle & Wilde 2002). The journal prices have been skyrocketing since the late 1970s (King *et al* 2000:60). According to Rogers *et al* (2000:14), journal prices went up by 200 per cent since 1986 resulting in massive

cancellations. Few libraries have been immune to the impact of inflation on journal prices and many have been involved in extensive journal cancellation projects (Enssle & Wilde 2002:259). The trend in cancellations of journals has been witnessed throughout the decade of economic downturn, bringing universities and university libraries of the Third World to the brink of chaos and possible extinction, with very few renewals being possible (Nwafor 1990:23). Out of concern, academic librarians have warned publishers about skyrocketing journal subscription rates and called for universities to launch their own non-profit publishing ventures (Leichtenberg 1998:26).

As a result, libraries with small periodical holdings, frequently receive complaints both from the users and the information providers serving them, as the use of standard indexing and abstracting journals, CD-ROMs and other computer-aided searches are all turning out to be frustrating when, after identifying several good references, the researcher is unable to retrieve documents from the collection. This is contrary to what would normally be the case when the collection consists of key journals in a given field covered by major indexing and abstracting services. This unfortunate situation that still persists today was revealed several years a go in a study by Tate and Wood (1968:356) who then wrote: “both library users and those serving them complain that cited originals are either unobtainable from local resources or that time required to obtain them is excessive.”

In a survey of the current status of library digitisation in sub-Saharan-Anglophone Africa half of the libraries that were connected indicated that slow speeds and reliability was a barrier to the use of e-resources (International Network for the Availability of Scientific Publications 2005:1). The use of CD-ROMs could be a better option but the problem with CD-ROM is that current information will not be immediately available – libraries will have to wait for updates. An evaluation of resources available on the Internet by Kenyan university librarians during a workshop acknowledged that there exist a lot of quality information on the Internet which can be downloaded free of charge or by shareware for academic and research use (University of Nairobi Library Electronic Resources Workshop 2000). Libraries could be alerting users using other methods such as

selective dissemination of information (SDI) and current awareness or bulletins, but these have limitations as the volume of literature increases, making timely identification and retrieval of specific information difficult. This is also a limitation of printed indexes.

The option of using only online databases to search for relevant information on the Internet is becoming more affordable and available for most Third World libraries. It is also more dependable particularly with the improvement in response time that has been slow for some of the online databases available on the Internet. A comprehensive literature review on the theory and practice of periodical indexing, principles and development of periodical indexing and the role, importance and appropriateness of in-house indexing in university libraries is provided in Chapter 2.

1.2 STATEMENT OF THE PROBLEM

In view of the above factors, much of the periodical information is not getting into the hands of people who could use it. There is a problem of identification, access and overall provision of relevant periodical articles to meet the academic requirements of the information seekers in developing countries and more particularly in sub-Saharan Africa.

The concern for this study was prompted by a noticeable lack of effective access to periodical literature in Kenyan university libraries. In the process of assisting the University of Nairobi library users (ie staff, students and other users) to identify periodical articles relevant to their requirements, the researcher observed that there is a need for a locating tool that could be used to locate information in periodicals. Renewal of subscriptions to key indexing journals had not been made for almost ten years. Browsing through content pages of periodicals stood as the main option for identifying articles on given subjects. This approach always turned out to be very frustrating and often fruitless. It nevertheless had to be used for periodicals acquired after 1991, the year when renewal of subscriptions to indexing journals stopped. It was necessary to establish whether the situation is the same at other universities in Kenya.

In the past the practice has been to arrange periodicals alphabetically on shelves, ready for use without further processing such as creating indexes, abstracts or citations to make available subject contents of individual issues held in these information centres. The practice still prevails in the developing world. This makes it difficult for users to access information contained in the periodicals.

Again over the years, the usage of the periodical literature has shifted from just seeking for known periodical issues that contain particular articles, to include provision of relevant citations on various subjects, and in some cases, to also include analysis of actual information. Most users no longer come to the library with known citations. This is more so with those who are used to Internet services. They expect the library to provide both citations and full text of relevant articles. Thus the role of the information provider serving them has changed from traditional document delivery to include document identification and analysis. Libraries are now adding value by assisting users in getting information by delivering a service not just a product, to remain effective in information provision business (Kaser 2002:33).

The trend of the usage of periodicals at universities is dependent on the purpose and academic levels. For instance, the undergraduate requirements of general treatment to graduate requirements of in-depth points-of-view and methodology are very apparent. Similarly, exposure by university library users to modern technological advancements in information handling is becoming another important source of criticism about the quality of service offered by the manual periodical information provider. The challenge faced by the provider of university periodical information in a developing country like Kenya, is trying to assist library users with varying academic levels and information requirements in terms of depth and sophistication, to obtain articles from large periodical collections. Often the collections are characterised by gaps caused by massive cancellations in subscriptions due to soaring prices of journals; reducing subscription budgets, with titles that are not necessarily selected before procurement, often received as donations; with few or no indexing or abstracting tools to assist in identifying and gaining access to

relevant contents of periodicals held by the library; heavily dependent on manual information retrieval systems; and little or no access to international databases.

According to Wellisch (1998), the need to have tools for information retrieval goes back thousands of years. The present state of utter confusion created by search engines that rely on the words of the text and sometimes on syntactic construction is already much deplored and even cursed by users who are either overwhelmed by undifferentiated masses of references or cannot find anything they want or need. An increasing use of human indexers in the coming century for the forging of the keys to the hidden treasures of information in all its forms was envisioned a decade ago (Wellisch 1998:59). The use of these proprietary indexes represents a better use of time and money for researchers as opposed to relying on open and freely accessible information on the Web (O'Neil 2002:3).

Librarians are increasingly turning current contents into database-browsable versions for use by their faculty. This enables the faculty to order articles from cancelled journals and helps solve the cancellation woes (Rogers 1997:25). Investigations have revealed that retrieval performance is highest at the most exhaustive representation and decreases slightly as terms are eliminated and as the indexing representation becomes less exhaustive (Burgin 1991:623). A subsequent study (Burgin 1995:562) notes that the performance of a retrieval system based on a single-link clustering was found to be poor and had the tendency of producing a small number of large, ill-defined document clusters.

Abstracting and indexing databases have been found to still be both relevant and necessary (Rabe 2002). With availability of more full text journal databases, the function of the abstracting and indexing database has been revived by indexing agencies. The indexing service, for instance, serves as a tool in the creation of a South African publications portal (Rabe 2002:80), which clearly justifies a growing need for indexing services in university libraries.

The need for fairly tailored computer-assisted in-house indexing has therefore continued to be evident if the libraries are to achieve maximum usage of available periodicals. A number of libraries in developed countries are indexing periodicals in-house to supplement imported online search facilities and enhance access to periodicals. Some are customising search terms to their institutional requirements for articles held in databases to enhance retrieval and improve on relevance of retrieved articles to meet requirements of researchers within their institutions.

A search using *Library and Information Science Abstracts (LISA)* and *Kenya Library Association Publications* shows that there is no study on in-house periodical indexing in university libraries in Kenya, hence the need for a study.

1.3 PURPOSE AND OBJECTIVES OF THE STUDY

1.3.1 Purpose of the study

Broadly, the purpose of this study is to survey the practices and current trends and identify the challenges of the in-house periodical indexing in academic libraries in Kenya with a view to recommending the development of an appropriate tool for accessing periodicals for use in these libraries.

1.3.2 Objectives of the study

In order to achieve the aforementioned purpose, the following objectives were formulated:

1 to explain the principles, practice and development of periodical indexing;
2 to determine the state of the art with regard to the identification, access and usage of periodical literature in university libraries in Kenya;
3 to examine the current practices of periodical indexing in university libraries in Kenya;
4 to explore the feasibility for in-house indexing of periodical literature in university libraries in Kenya.

1.3.3 Research questions

Specifically, the study seeks to answer the following questions:

1. What is the position as regards access, identification and usage of periodical literature in university libraries in Kenya?
   a. What is the current state as regards the holdings of periodical literature in university libraries in Kenya?
   b. Which methods and/or tools are employed by library users and librarians to identify, access and obtain relevant articles from periodicals held in university libraries in Kenya? Are they adequate and/or effective?
   c. What are the expectations of periodical literature users of university libraries in Kenya in view of the advent of modern information handling technology?
   d. To what extent do the available indexing tools affect usage of periodical literature by university libraries in Kenya?
2. How do the principles and practice of indexing influence the usage of periodicals in university libraries in Kenya?
   a. Are there any notable developments that have occurred in the practice and theory of periodical indexing in university libraries in Kenya?
   b. What effect can indexing have on retrieval performance? Is the quality of indexes in university libraries in Kenya effective in retrieving relevant information contained in periodicals held by the libraries?
3. Is in-house indexing of periodicals held in university libraries in Kenya feasible?
   a. Is there a need for indexing periodicals held by university libraries in Kenya? If so, how should indexing of periodicals be done in university libraries in Kenya and who should do it?
   b. What benefits can be realised if university libraries in Kenya index their periodicals?

1.4 MOTIVATION FOR THE STUDY

The need to improve on the use of relevant articles contained in periodicals held in libraries and in databases subscribed to by university libraries in Kenya motivated the study. While assisting researchers at the University of Nairobi library mainly through browsing content pages of journals and electronic databases, the researcher noticed a high demand for periodical literature which was increasingly becoming difficult to access due to the lack of retrieval tools.

Although library patrons use databases such as *EBSCO*, *Wiley InterScience*, *Springer* and *JSTOR*, and since most periodicals can now be searched using search facilities on their websites, most locally produced periodicals are not indexed in key bibliographic e-databases. It was necessary to address the question of relevance, completeness, omission due to editorial policies, biases and points-of-view and the urge to explore in-house indexing as an option for improvement in quality of indexing through customisation of search terms.

The expression of dissatisfaction by researchers when they fail to get relevant articles or do not get the articles they need fast enough, the need to be prepared to serve researchers on the required level of specificity and the ability to achieve a high precision ratio both for print and electronic periodicals, also contributed to the initiation of the current study.

As a filtering agency, the indexing unit of the library engages in a process of scanning all incoming periodicals and all retrieved articles during a search, working on keywords to suit local requirements. A number of libraries in the developed world are employing indexers to play this role and continue to enhance access to their periodicals (both print and electronic). It was necessary to find out the status quo in university libraries in Kenya and if in-house indexing could be feasible for libraries in Kenya.

1.5 SIGNIFICANCE OF THE STUDY

The findings of this study will be of significance to university libraries in Kenya and their library users in a number of ways.

An improvement in bibliographic control of literature will improve the identification and access to information sought by library users for academic and research requirements.

Although not all university libraries were included in the study, the results of this study can be generalised to all university libraries in Kenya and other developing countries, since they operate under similar economic conditions. The findings of the study will assist in the development of a tool that can help library users locate relevant articles in their periodical collections to meet their academic requirements.

The study will lead to the establishment of in-house indexes which will result in high precision ratios in the retrieval of articles contained in periodicals held in university libraries in Kenya.

The study will also create an awareness that is likely to lead to enhanced cooperation and resource sharing between university libraries through direct access to the databases on the Internet and the servicing of search requests. Consequently, duplication of some periodical subscriptions that occur for lack of awareness of periodical holdings of other libraries, is likely to be avoided and thus funds could be saved and could lead to the subscription of a larger variety of titles.

There is no documented information on indexing in university libraries in Kenya. The study therefore, is expected to provide a clear picture of the state of the art as regards periodical indexing and the overall access to periodical literature in university libraries in Kenya.

The study will also contribute to the literature on indexing of periodicals in university libraries, especially in Africa.

1.6 SCOPE AND LIMITATIONS OF THE STUDY

There are several academic libraries in Kenya which include school, college and university libraries. However, this study concentrated on university libraries, both public and private (see Appendix 6). This was necessary for purposes of in-depth coverage of the aspects under investigation and level of information targeted by the study. The study aimed at gathering information that could be applied to other university libraries, particularly those in the developing world.

Branch libraries receiving at least 20 periodical titles with over 500 volumes of periodicals and with a population of at least 200 researchers (ie final year and post-graduate students as well as other researchers) were treated as separate libraries, since they met the objectives of the study in terms of user population and size of collection. The undergraduate students are expected to research and prepare a report on a given topic as part of their final year assessment. An annual enrolment of at least 200 students served as an indicator of the size of the library and as a way of capturing a homogenous group of researchers. Lecturers and postgraduate students were included in the study and investigated as a special category of researchers. This category of users whose needs for information varies with points-of-view, recency, depth and purpose were used in participatory observations and in interviews. All universities listed in the *Kenya education directory* (2000 edition) were included in the sample. A detailed description of the methodology and approaches used to conduct this study is provided in Chapter 3.

1.7 DELIMITATIONS OF THE STUDY

The study does not include libraries in primary and secondary schools. Although these institutions are considered as academic institutions, their academic status did not meet the level and aims of the study which targeted university libraries. Only libraries serving departments and colleges of universities were part of the study. Libraries with an annual student enrolment of less than 200 students were not included in the study. Such libraries were considered small and with less research activity, typical of what is witnessed in medium-sized university libraries that the study was targeting.

Lecturers and post-graduate students who did not make requests for literature searches during the period studied, were only covered in the study selectively to get information considered pertinent to the study. It was important to gather information from this cadre of researchers, most of whom would have utilised existing periodicals before and are authors in their respective fields. This was mainly to help understand the reasons for their non-use and get their comments on issues such as exhaustivity, specificity, recency, point-of-view, bias and other factors within the scope of the study.

1.8 ORGANISATION OF THE DISSERTATION

The dissertation consists of preliminary pages and six chapters. The preliminary pages focus on: title page; declaration; dedication; acknowledgement; definition of terms; abstract; and table of contents.

Chapter 1 consists of background information to the study; statement of the problem; the purpose, objectives of the study, and research questions; motivation for the study; significance; scope and limitations; delimitations; dissemination of the findings; and chapter summary.

Chapter 2 covers the literature review; Chapter 3 describes the methodology used in the study; Chapter 4 presents results of the study; and Chapter 5 discusses the results.

Chapter 6 provides a summary of the findings; conclusion; recommendations; and suggestions for further research.

1.9 DISSEMINATION OF THE FINDINGS

It is envisaged that an article with a theme based on the findings will be published in a scholarly journal in the field of Library and Information Science.

An abstract of the dissertation will be submitted for publishing in *Dissertation Abstracts* and this will be available on the Internet for wider consultation and readership.

The findings of the study are expected to be presented at conferences, seminars and workshops both local and international.

A paper summarising findings will be presented to the Kenya Library Association secretariat and also mailed to all university librarians in charge of university libraries in Kenya.

Copies of the dissertation will be submitted to the Department of Information Science, University of South Africa for departmental use.

A copy of the dissertation will be deposited at Unisa Library. Another copy will be given to the University of Nairobi Library to be placed in the Africana section of the main library for use by researchers and other library users interested in this area of study.

The author will give written consent to libraries and information centres that may request to keep a copy of the unpublished dissertation as part of their collection.

1.10 SUMMARY OF THE CHAPTER

The growth in periodical literature over the years has continued to be phenomenal. The question about which of the journal(s) contain(s) the information a particular user is looking for has continued to be of growing concern to the information professionals serving researchers in university libraries. There has been a need for a tool for locating relevant information from the periodicals. The advent of information and communications technology (ICT) lends itself as a vehicle for assisting in the storage and retrieval of information to the specificity that researchers require.

This study sets out to determine the status quo as regards the indexing, identification and access to periodical literature in university libraries in Kenya. It also explored the feasibility of in-house indexing in university libraries in Kenya and made suggestions for improving access to periodicals.

The findings of this study are significant to university libraries in Kenya and their library users, as it will help locate and enhance access to relevant articles in their periodical collections. The next chapter provides a detailed review of the literature related to theory, practice and the development of indexing as it applies to periodical indexing in university libraries and a detailed insight into the in-house indexing of periodical literature.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

This chapter covers the literature reviewed during the study period. Information contained in books, periodical articles and from the Internet, considered relevant to the aspects of indexing under investigation, was reviewed. The review is part of the study aimed at determining developments that have occurred in the indexing of periodical literature. It specifically dwells on the theory, processes and practices in periodical indexing with particular reference to their application in university libraries. The review also sought to determine evidence of in-house indexing in university libraries as reported in the literature. The ultimate aim of the review is to understand pertinent issues and views as raised in the literature before investigating the various aspects of indexing and periodical literature in university libraries in Kenya. This is expected to assist in gaining the necessary background information and to also establish an appreciation of the developments in periodical indexing that could be adopted by university libraries in Kenya to improve on the access and usage of periodical literature.

The availability of literature on periodical indexing is quite extensive and cannot be covered in its entirety. Only part of the literature was reviewed in order to understand issues at hand and to also answer respective research questions. The literature related to the study was reviewed under the following subsections:

Principles of indexing

Development of periodical indexing

The indexing practice and usage of periodical literature by university library researchers

In-house indexing

Summary of the literature review

2.2 INDEXING PRINCIPLES

Indexing has been defined as the process of selecting words and phrases for subject headings, subheadings and cross references (Thomas 1998:60). When indexed, the information is organised and referenced in a manner in which it can be easily utilised by the searcher.

2.2.1 Aims and objectives of indexing

In a paper on academic indexing, Todd (1994:101) examined the purpose of indexing and posed the following questions: What is indexing? Is indexing intended to make documents retrievable to satisfy information requests, or is indexing intended to convey the information conveyed in a document? What indexing is, who does indexing, how indexing is done, whether a computer can do indexing, the skills and education needed by indexers, are some of the frequently asked questions about indexing (Harrison & Wyman 1998:37).

Several authors have written on the aims and objectives of indexing (Thomas 1984; Ward 1996; Wiggins 1993). Ward (1996:217) states that the aim of indexing is to convey the contents of technical and other documents, which may be thousands of pages long and written in a variety of languages, in such a way that users can assess the value and decide whether they are worth reading and subsequently may be retrieved – when the text base is interrogated – with maximum recall and precision. Wiggins (1993:13) maintains that indexes indicate specific and likely relevant items of information within that collection. They provide conceptual access to the stored information. While, according to Thomas (1984:83) whether done by an author, indexer or database contributor, the object of the production of an index has been until now, and will continue to be, to enable humans keep track of their knowledge.

While agreeing with Ward's view (1996) that when applied to a text-based index where the user can read the full text, abstract, or sections of the document online by interactive searching using keywords in the text as indexes, an index alone does not convey adequate information to enable users assess the value or decide on whether a

document is relevant or not. Rather, the aim of indexes (Thomas 1984; Wiggins 1993) is to enable humans to keep track of their knowledge by serving as keys that guide users to stored information by indicating specific and likely relevant documents to enable them to locate and determine the ones relevant to their requirements by providing access through the indexed aspects of the documents.

2.2.2 Need for indexing

The need for indexing is best summarised by the experience of Valauskas (1994:101):

> Try to find an article, an ad or an author in a non-indexed magazine. You will keep telling yourself, 'I know it's in here some place. Was it in the fall issue for '85 or spring issue for '89?' Member after member wrote and phoned the Apple Library wondering when an index would appear. Sensing this frustration when searching even my own stories in the *Apple Library Users Group Newsletter,* I decided to take on the indexing chore.

In her introduction, the editor of *The Weekly Review* states that, the difficulty of retrieving information about Kenya's recent past led to a proposal in 1987 for *A Weekly Review Index*. With its completion, it is now possible to refer quickly to innumerable topics that were mentioned, or covered in detail in 766 issues during the fifteen-year-period, 1975-1989 (Thomas 1993:i).

The index provides access to information about events in Kenya's history and the role of the individual and institutions that were involved. It also provides access to views of information and responsible commentators who were watching those events. An editorial remark by the Managing Director of Ngarua Services (1999:i), who publishes *Ngarua Periodical* Indexes states that: "the region's newsprint industry continues to grow rapidly, and increasingly contains excellent articles on various issues affecting our region and the world. However, the use of these articles for research has been greatly hampered by a lack of a periodical's index that would make locating relevant articles much easier. It is with this in mind that *Ngarua* services has put together this comprehensive list of business articles that have appeared in the region's newspapers and magazines", adds to the above experience on the need for indexing. The need for indexing is vested in the functions of an index.

2.2.3 Functions of an index

As Wellisch (1994) puts it, the indexing of all verbal texts whether in print or electronic form must fulfil certain functions if the resulting index is to retrieve or find a particular name, term or passage in a text that the user has either read before, or that is presumed to contain the desired information.

The American, British and International Standards (National Information Standards Organization 1993; British Standards Institution 1988; International Organization for Standardization 1994), which are largely worded the same way on this issue and express the considered judgment of experienced indexers, stipulate the following basic functions of an index: the function of an index is to provide users with an efficient and systematic means for locating documents or parts of documents that may address their information needs or requests. An index should therefore:

- identify and locate potentially relevant information in the document or collection being indexed;
- discriminate between information on a topic and passing mentions of a topic;
- exclude passing mentions of topics that offer nothing significant to the potential user;
- analyse concepts treated in a document so as to produce suitable index;
- use headings based on its terminology;
- indicate relationships among topics;
- group together information on topics scattered by the arrangement of the document or collection;
- direct users seeking information under terms not chosen as index headings to terms that have been chosen by means of *see* references;
- suggest to users of a topic to look up also related topics by means of *see also* references;
- arrange entries into a systematic and helpful order.

The growth of primary literature which is reflected by the growth of secondary services has made it a physical impossibility for any person to keep abreast of information in a

particular subject area. According to Keenan (1980:168), the basic function of an indexing service is therefore to save the time of the user. Keenan describes indexing services as essential tools that fulfil two major functions namely:

a. Current awareness – providing the user with rapid and current information on documents in a particular field of interest.
b. Archival functions – providing the user with a retrospective collection that allows for an exhaustive search for information over a period of time and also adds that indexing services can facilitate the selection of documents.

2.2.4 Indexing characteristics and retrieval performance

Libraries are expensive and research libraries are particularly expensive with few people having access to scholarly information owing to poor systems (Arms 2000). Indexing that facilitates access, is an expensive undertaking (Anderson & Perez-Carballo 2001). It is therefore important to know whether indexing is worth the cost, whether indexing improves retrieval performance and what characteristics of indexing are important to achieve an improvement in the identification and retrieval of information.

Soergel (1994) identifies three concepts that are central for good indexing and for assessing retrieval performance, namely, topical relevance, pertinence and utility. Topical relevance exists when there is a relationship between an entity and a topic, questions, or task. A document is topically relevant for a question if it can, in principal, shed light on the question. “In principal” means that the document can do so for a person (or system) who knows the language of the document, has the background to understand the document and is capable of processing information transmitted by the document in relation to the question. “Shedding light on” means that the document provides information that either directly answers the question or is part of a premise set from which the question can be answered through a chain of inferences.

An entity is, according to Kemp (1994:37), pertinent if it is topically relevant and if it is appropriate for the person. That is, if the person can understand the document and apply the information gained. Pertinence is the relationship between an entity and topic, question, function or task with respect to a person (or system) with a given purpose. The degree of relevance depends on a number of factors:

- The amount of relevant information given.
- The strength of the relationship between the information given and the question.
- The strength of the contribution to the quality and/or surety of the answer.
- Perhaps other factors.

In a study (Ruthven, Beillie & Elsweiler 2007:482) interest, knowledge and confidence were found to have an effect on how many documents were assessed as relevant and the balance between how many documents were marked as marginally or highly relevant. Also, these factors were shown to affect the user's ability to predict what information they would finally mark as being relevant. Different aspects of a user's context, in particular his/her knowledge of a search topic and his/her confidence in assessing relevance judgments made and the user's ability to predict which documents he/she would asses as being relevant.

An entity has utility, according to Cooper (1971:19) and Goffman and Newill (1967:9), if it is pertinent and makes a useful contribution beyond what the user knew already. Utility according to them might be measured in monetary terms – how much is having found this document worth to the user? They argue that a pertinent document may lack utility for a variety of reasons, for example, the user may already know its contents. It is therefore important for the indexing system to allow for retrieval of articles that are topically relevant, pertinent and have the necessary utility to the user. Such a system must have built-in characteristics that affect retrieval. Soergel (1994:589) has offered a description of the characteristics of indexing that affect retrieval. These include: the overall approach to indexing; indexing devices; exhaustivity of indexing; indexing specificity; indexing correctness; indexing consistency; and indexing policy.

2.2.4.1 The overall approach to indexing

The approach taken to indexing has a major impact on the quality of indexing and therefore on retrieval performance. According to Cooper (1978), Fidel (1994) and Soergel (1985), indexing can either be entity or request oriented.

In request-oriented indexing, the index language is built from a detailed study and logical analysis of user requirements and then serves as a communication device from user to indexer. The indexing language communicates to the indexer a conceptual framework to be used as a checklist for indexing. In entity-oriented indexing a checklist of indexing terms is made based on the contents of the item being indexed. The idea is to maximise as far as possible the probability that a descriptor needed in searching is available in the index terms and is used properly in indexing.

The approach to indexing has a large effect on the availability of just the right descriptors needed for searching and on the correctness of indexing, thus it can be expected to have a major impact on retrieval performance. Request-oriented indexing is designed to dramatically increase the ability to ask the questions one needs or wants to ask as illustrated in study investigations (Pejtersen 1980; Pejtersen & Austin 1984).

2.2.4.2 Indexing devices

Soergel (1994) gives the following structural and syntactical indexing devices that affect retrieval: hierarchy, degree of combination, links and role indicators and weights.

Hierarchy is described by Soergel (1994:589) as the most important structural device. It is a prerequisite for request-oriented indexing. It provides a framework for the indexer and has positive effects on indexing correctness, which in turn improves retrieval. A well-structured hierarchy provides an indexing framework for the indexer and thus supports the indexing process. Hierarchy also has a direct effect on searching. It provides a framework for the searcher in formulating the query and thus supports choosing the most appropriate descriptors. The structure may even assist the user in thinking about the problem and discovering ramifications and new aspects. In the

search itself, hierarchy is the basis for inclusive searching. “In inclusive searching, a query descriptor retrieves entities indexed by any narrower descriptor as well” (Soergel 1994). Inclusive searching applies the knowledge encapsulated in the index language hierarchy to provide a powerful search tool that boosts recall. Inclusive searching is particularly important in systems that use a high specificity of indexing or a high degree of combination.

The degree of pre-combination has been cited (Soergel 1985:411) as an element of index language structure that tends to degrade indexing specificity. A high degree of pre-combination makes indexing more difficult and thus may affect indexing correctness, if no other reason than to increase the number of descriptors in the index language. Pre-combination comes in handy when there is a pre-combination descriptor that matches the query topic. In a computer system, a pre-combined descriptor helps avoid spurious combinations. Pre-combination can however, cause difficulties in retrieval. Unless all conditions are fulfilled, the searcher must compensate for the deficiency by including the pre-combined descriptors in the query formulations, least recall suffer.

Links and role indicators have been suggested (Korner 1985:82) as the two most important syntactical devices. Links express relationships between descriptors that are stronger than mere co-occurrence in the indexing of the same entity. They are particularly important in cases involving a low degree of pre-combination. Role indicators specify the role of a descriptor in the context of an entity representation. They are linked to the descriptor whose role they specify, least confusion reigns. Links and role indicators are used to formulate a more discriminating query, but their use has to be with care as they can make for another opportunity for mismatch between indexers and searchers, and thus recall may drop.

Early experiments gave role indicators a bad name (eg Sinnett 1963). However, the performance degradations reported reflect more poorly designed systems operated by poorly trained people on the merits of the concept. Montague (1965:202) gives a

balanced account, in that role indicators may be particularly useful for queries that combine very broad concepts in specified roles.

Indexing weights differentiate descriptor assignments by importance. This is useful in systems that use low importance thresholds (high exhaustivity in indexing).

2.2.4.3 Exhaustivity of indexing

Soergel (1994) defines the exhaustivity of indexing as the extent to which concepts are covered by the descriptors assigned to the entity. According to Soergel, the entity being indexed is relevant in varying degrees to a number of concepts. Exhaustivity has two components, namely, viewpoint exhaustivity and importance exhaustivity. Viewpoint exhaustivity addresses the question “are the facets or viewpoints useful for retrieval represented in the index language and thus available for retrieval?” (Soergel 1994:592). The degree to which this question can be answered with “yes” is viewpoint exhaustivity. We can, according to Soergel, add the following three facets to increase exhaustivity: level of difficulty, quality and ideological orientation of the author.

Higher viewpoint exhaustivity extends the kind of questions that can be asked of a system. It affords a searcher an opportunity to achieve higher discrimination, possibly but not necessarily, at the cost of decreased recall. Adding a facet, research methods such as survey studies, panel studies, case studies and field studies to viewpoints indexed, tend to increase discrimination of research studies. Indexing completeness might be low if the indexers are not sufficiently trained in research methods to recognise the use of panel studies, survey studies, case studies and field studies. Adding viewpoints to a query formulation is strictly an option. If the indexer expects that the option would reduce recall and recall is at a premium, he may elect not to use the option.

Importance exhaustivity addresses the question: what is the importance threshold for the assignment of descriptors as prescribed in the indexing rules? For the indexer

considering an entity, this question takes the following form: which of the concepts associated with this entity are important enough to warrant indexing?

The searcher considering a descriptor for a query formulation looks at the importance threshold from a different perspective: will the descriptor find only documents that are centrally important or will it also find documents that just touch on the descriptor? This question addresses the descriptor view of importance exhaustivity. What really matters in a search is not a general importance threshold but the importance threshold used for each of the descriptors that make up the query.

The rules given to the indexer define the level of exhaustivity intended in the system. Retrieval performance also depends on the application of these rules. The average number of descriptors assigned to an entity in the database being studied is often used as a standard measure for exhaustivity. This would work if exhaustivity was the only determinant of the number of descriptors per document. But as Maron (1979:224) puts it, there are other factors, such as properties of entities being indexed, the degree of pre-combination, the correctness of indexing and the indexing policy with respect to the assignment of descriptors that are broader or otherwise related to a “best fit” descriptor.

The system with more entities for a given descriptor is more exhaustive with respect to that descriptor. Effects of importance exhaustivity are more complex. When the query is held constant, higher exhaustivity delivers the same or higher recall with the same or lower discrimination, depending on the situation. Higher importance exhaustivity can sometimes be exploited to achieve higher discrimination, since it affords the searcher an opportunity to reformulate the query by adding an additional restrictive criterion. For instance, a document is judged relevant if it concentrates on “alcohol dependence” and at least mentions depression. With low exhaustivity the query should be just “alcohol dependence”. Qualifying it with depression would reject many relevant articles as to be unacceptable. With high exhaustivity and weights, the query could be narrowed to “alcohol dependence” (highly weighted) AND “depression” (any weight). This would boost discrimination and detract little from recall. The only documents missed would be

borderline documents where the indexer thought the mention of depression too insignificant while the user judged the document relevant.

Free text searching may be used to compensate for low indexing exhaustivity, provided the search concept is represented explicitly by a word or phrase. In most cases to retrieve relevant articles, indexing weights allow the searcher to choose for each query descriptor the level of importance exhaustivity best suited to the user's requirements. In a high exhaustivity system without weights, the query formulation would be "alcohol dependence" AND "*depression",* retrieving documents in which both disorders are mentioned, including documents where "*alcohol dependence"* is just mentioned, not dealt with intensively as required by the user. Thus this query would find both, more or less, and the effect of recall and discrimination depends on what is in the collection. The indexed terms are combined using Boolean logic to retrieve documents with required concepts and biases.

2.2.4.4 Specificity of indexing

Specificity of indexing is defined "as the generic level at which the concepts assigned to the entity are expressed" (Soergel 1994:593). As a practical matter, post-combination indexing is often more specific than pre-combination indexing, it is just not possible to include all possible pre-combinations. Therefore, comparing the specificity of indexing in two systems requires that all descriptors be reduced to elemental concepts.

Indexing specificity relies heavily on existing authoritative terminology. Terms and definitions pertaining to conditions prone to fluctuations tend to be reviewed from time to time. For instance the category title for depression and bipolar disorders in psychiatry was changed from affective disorders to mood disorders and within a short period thereafter mood swing and mood stabilizer became commonly used terms. The term "mood" was seldom part of psychiatric literature until 1970 and "mood swing" and "mood stabilizers" have been described as non-specific and misleading concepts as a basis for treatment decision and as such research on mood variations is needed to remedy the terminology situation (Safer 2010:685).

Intended specificity is the standard defined by the descriptors in a system's index language and by indexing policies. Actual specificity may fall short of the standard set by intended specificity due to indexing errors. An indexer may be unable to differentiate between specific descriptors or information used in determining the most specific descriptors.

The effects of indexing specificity depend on the specificity of the search. A specific search can take advantage of specific descriptors to increase discrimination, but for a broad search specific indexing does not help and may even be harmful. The effects of specific indexing on a specific search depend on the correctness of indexing. Specific descriptors make the search more vulnerable to indexing errors. If the indexing is correct, using a specific descriptor affects recall very little, if at all. But, if the indexers are unable to determine the proper specific descriptor and resort to assigning a broader descriptor instead, specific descriptors become less reliable.

The effect of specific indexing on a broad search depends on the capabilities of the search system. As long as the index language has a well-developed hierarchy and the search system supports inclusive searching, it is not a problem and neither search effort nor retrieval performance is affected. But when inclusive searching is not provided, the searcher looking for a broad descriptor must remember to include in the query formulation all the narrow descriptors seen from the hierarchy. When the index language does not have a good hierarchy, the searcher must think of all narrow descriptors, possibly consulting reference tools. Since the searcher cannot be expected to come up with a complete list of narrow descriptors, recall suffers.

2.2.4.5 Indexing correctness

Indexing correctness or absence of indexing errors is of overriding importance for retrieval performance. In their book, King and Bryant (1971) evaluated information services and products and established that indexing is susceptible to two kinds of errors, namely, errors of omission whereby a descriptor that should be assigned is

omitted and errors of commission whereby a descriptor that should not be assigned is nevertheless assigned. To determine indexing errors one must know for each entry which descriptors should and should not be assigned. Correctness of indexing can be determined for example, through several good indexers and knowledgeable users. King and Bryant (1971) give the following two measures of indexing correctness: completeness of indexing and parity of indexing.

Completeness of indexing relates to the presence of the correct descriptor assignments, the absence of errors of omission. The indexer considers an entity and descriptors assigned to it and asks “of the descriptors required for this entity by the rules of the system, how many are actually assigned?” This question addresses the completeness of indexing for each entity. As a formula (Soergel 1994:594) the completeness of indexing (entity view) is as follows:

$$\text{Completeness of indexing (entity view)} = \frac{\text{Number of descriptors that are assigned currently to the entity}}{\text{Number of descriptors that should be assigned to the entity}}$$

A searcher considering the use of a descriptor for a query formulation is more interested in a different question namely, “of all the entities that should be indexed by the descriptor, how many are actually so indexed?” This question addresses the completeness form the point of view of a descriptor as it appears in the whole collection the descriptor view of completeness. As a formula (Soergel 1994:594) the completeness of indexing (descriptor view) is expressed as follows:

$$= \frac{\text{no. of entities to which the descriptor is correctly assigned}}{\text{no. of all entities to which the descriptor should be assigned}}$$

The descriptor-view measure is more difficult to determine but it is more useful for predicting retrieval performance. It is directly related to recall.

Purity of indexing relates to the absence of erroneous descriptor assignments and the absence of errors of commission. Purity of indexing can also be viewed from an entity taken individually or from a descriptor as it occurs – or does not occur – in the collection. The formulas (Soergel 1994:594) are expressed as follows:

Purity of indexing (entity view)

$$= \frac{\text{no. of descriptors that were correctly rejected for the entity}}{\text{no. of all descriptors that should have been rejected for the entity}}$$

Purity of indexing (descriptor view)

$$= \frac{\text{no. of entities for which the descriptor was correctly rejected}}{\text{no. of all entities for which the descriptor should have been rejected}}$$

The descriptor-view measure is used to predict retrieval performance. It is directly related to discrimination. The higher the purity value, the better the indexing.

According to Soergel (1994:595) indexing correctness is a major determinant of retrieval performance. With correct indexing, the searcher can rely on the descriptor assignments and feel confident about retrieval results. This is particularly important in the search for a concept that would be hard to search using a free text approach. An indexing error omission leads to low recall. If the indexers' vigilance fails, retrieval losses will occur. Conversely, "over-indexing" with a descriptor due to lack of proper understanding affects discrimination. Correct indexing requires indexers who are well trained and familiar with the subject matter and the needs of the users as reflected in the index language.

2.2.4.6 Indexing consistency

Successful retrieval of stored information depends to a significant extent on consistent and therefore predictable representation of subject matter in the retrieval system (Reich & Biever 1991:336). Difficulties with "aboutness" and inconsistency result in poor quality indexing which in return hinder the quality of information retrieval. Consistency is

therefore another important issue of critical concern that later imparts on retrieval performance.

If we reflect on definitions for the concept “subject” we would discover that the notion of what a subject actually is, is not consistently represented. As suggested by Todd (1994:103) from the very onset of the indexing process, we are confronted with no consistent or clear explication of what we are looking for in a document in order to represent its intellectual contents as subjects in some indexing systems. Yet it is expected that a subject indexer will select subjects – whatever they are – from all the concepts, propositions, arguments and examples expressed by the author.

Several studies have been conducted to measure how consistently a given indexer or group of indexers will index a set of documents (intra-indexer consistency) and how consistently a group of indexers will index the same document or set of documents (inter-indexer consistency) (Cooper 1969; Leonard 1975, 1977; Zande & Dexter 1969). Zande and Dexter found that no one index term was selected by all indexers and no two indexers selected the same set of terms for the document in question. Cooper (1969:268) cites some studies with consistency values ranging from 10%–80% and others with values ranging from 40%–70% and recognizes the phenomena of inconsistency also calling it the rule rather than the exception. According to him, the crucial question is: “What is the relationship, if any, between the level of inter-indexer consistency obtained under a given indexing method and level of retrieval performance achieved when the indexing is done by that method?” Cooper (1969:268) concluded that an increase in inter-indexer consistency will not necessarily result in an increase in retrieval effectiveness, even if inter-requester consistency is held constant. According to him, there is as yet an unknown relationship between inter-indexer consistency and retrieval effectiveness and that until such a relationship is derived, indexing consistency cannot safely be used as a gauge of indexing quality.

In 1975 and 1977, Leonard conducted an in depth investigation into the issues raised by Cooper (1969). The purpose of his study was to “investigate the relationship between

inter-indexer consistency among a group of indexers and the retrieval effectiveness resulting from their code and term assignments" (Leonard 1977:51). This test of the relationships between recall, precision and consistency concluded that inter-indexer consistency and retrieval effectiveness exhibit a tendency toward a direct positive relationship, ie high inter-indexer consistency in the assignment of terms appears to be associated with a high retrieval effectiveness of the document indexed. The concern for maintaining high consistency in indexing seems to have been valid and the works of developing and applying indexing rules and vocabulary controls seems justified.

Most research on indexing consistency has been experimental, not examining operational systems. Funk, Haynes, McKibbon, Walker, Ryan, Fitzgerald and Ramsden (1983:176) however, studied the phenomenon in *MEDLINE* and found results similar to those of experimental studies. In the research by Sievert and Andrews (1991:1), a subject-specific or subject-restricted document file, *Information Science Abstracts* (ISA) was searched for documents entered and indexed twice. Like Funk's, this research focused on an operational system rather than on experimental situation and found that there was more consistency in the assignment of descriptors than identifiers, 47.27% to 32.83%, a difference of 14.44 percentage points. They concluded that: "If high retrieval effectiveness is required, and the searcher or patron is willing to accept high recall, it seems best to search descriptors or main heading descriptors alone."

Data from this study showed that indexing consistency dropped as indexing depth increased. But a comparison with the data from the duplicate indexing of *MEDLINE* did not show a similar pattern and confirms Svenonius's call (1986:331) for further research on the relationship between indexing depth and retrieval effectiveness (Svenonius 1986:141). Research in other files where a small number of terms per document are assigned from a small vocabulary might reveal more about the bipolar distribution. Earlier studies did not reveal such situation. The question remains whether it is unique to *Information Science Abstract*s. The phenomenon is best summarised by the remark made by Todd (1994:102) that

> … while different formulae for measuring the degree of inter-indexer consistency make generalizations difficult, it can be said as a broad characterization of findings that huge variations have been observed in the levels of inter-indexer consistency arising under different circumstances. In no case have perfect or high levels of consistency been reported: substantial amount of inter-indexer inconsistency is the rule rather than the exception.

According to Chu and O'Brien (1993:440) the choice of the appropriate terms is heavily dependent on the result of the subject analysis stage and should not be wholly attributed, as in many indexing consistency studies, to indexer experience and particulars of indexing systems. Consistency is crucial at all stages in the indexing processes. Inconsistency during subject analysis can be the result of expressing subject concepts in different ways at different levels of specificity and can lead to varying terms chosen for similar documents (Jones 1983).

Thesauri (ie subject authority lists) are designed to bring consistency and predictability to information storage and retrieval processes. Agee (2008:30) defines a thesaurus as a controlled vocabulary arranged in a known order and structured so that the various relationships among terms are displayed clearly and identified by standardised relationship indicators is an input/output device whose purpose is to bring the language of the searcher into coincidence with the language of the indexers. Thesauri have two interdependent functions:

- To introduce order and language standards into indexing terminology (the indexing consistency function).
- To serve as a source of searching vocabulary (the retrieval function).

Given the vast complexity of natural languages and the many connotations of the worlds in those languages, absolute precision in indexing is probably impossible, even with controlled vocabularies (Sievert & Andrews 1991). There exist extensive studies which show inconsistency on the art of indexers in their choice of indexing terms for similar texts (Leonard 1977; Middleton & Di Orio 1984). Middleton and Di Orio (1984:33) obtained match rates of 22 per cent and 18 per cent when comparing terms assigned to

the same references by different education indexers. Leonard (1977:51) reported widely divergent results in his survey of inter-indexer consistency studies.

Observations of a database indexer's working life (Ruppel 2006:57), indicate that:

- "keywords" provided by the authors are incomplete, if not irrelevant;
- expertise in a particular field does not translate into indexing or search expertise in that field;
- indexers should learn to search. Searchers should learn to index;
- over indexing is a lesser sin than under indexing.

Results of a study by Reich and Biever (1991:336) indicate that broad search strategies, which in effect negate the precise retrieval capabilities of a highly specific indexing vocabulary, are often necessary for adequate document recall. The study which measured inter-indexer consistency as determined by the number of identical terms assigned to the same documents by two different indexing organisations using the same thesaurus as a source for entry vocabulary, derived consistency figures of 24 per cent and 45 per cent for two samples. According to them, factors in the consistency failure include "variations in indexing depth; differences in choice of concepts for indexing; different indexing policies; and a highly specific indexing vocabulary." The Reich and Biever (1991:336) results indicate that broad search strategies are often necessary for adequate yields, since consistency and therefore the ability to predict the indexer's terminology appears to be more difficult to attain, "with increasing vocabulary specificity the fact that users generally have not had access to the policies deriving term selection and the indexer's perception of the significant elements, variables which are outside the control of a thesaurus."

The implication is that articles which are similar may, and often would be, indexed differently. Their similarity would not be reflected in the sets of indexing terms assigned to these articles. This notion, according to Todd (1992:103), introduces a great deal of uncertainty in any information retrieval system, he therefore remarks that the concern

with indexing consistency is not new and must be given due consideration during indexing. Indexing consistency affects retrieval performance only indirectly, through its possible effect on indexing correctness. According to Soergel (1994:596), the best overall retrieval results can be achieved with systems that let the searcher emphasise the search outcomes in accordance with the requirements of each search. Such flexibility can be achieved through the following combination of features:

- an index language that covers all viewpoints needed in retrieval and arranges its descriptors in a well structured hierarchy;
- links and role indicators;
- exhaustive indexing (low importance threshold) with weights;
- specific indexing and inclusive searching;
- well-trained indexers who are sufficiently familiar with the subject matter and with user needs as reflected in the index language to make the judgments necessary for correct indexing.

Retrieval performance is a function of the agreement of the judgments of two parties, the indexer and the user, with respect to the viewpoints used in indexing, the general importance threshold used and the specific judgments regarding the importance of a specific descriptor for a specific entity. The goal of indexing must be to maximise that agreement. Information retrieval is about meaning while we can get at meaning through statistical and syntactic/semantic processing. In many other cases, perhaps the more important ones, we cannot and human judgment, no matter how often it is maligned as subjective, must step in, suggests Soergel (1994: 596). Vocabulary categorisation, adherence to predetermined indexing rules and expert knowledge on the other hand renders the selection of the essence more predictable – and consistent.

What is needed for the effectiveness of an information system is indexer-requestor consistency, ie the requester in the representation of the concepts of interest (at least to such a degree that an algorithm can eliminate remaining, largely formal discrepancies, for example by truncation). An overall inter-indexer consistency is neither a necessary

nor a sufficient criterion of indexing quality and retrieval effectiveness. It is indeed merely a perplexing hobgoblin.

Precision has always been the hallmark of fine indexing. It is not unreasonable to suggest therefore, that serious thought and discussion be given to the idea of changing the title indexer to a more precise, accurate identification, such as information specialist or informant since the indexer links the document to the user by analysing and exposing its content, attaching meaning to various concepts and linking these with existing vocabulary, putting these in user perspective and determining document “aboutness” as accurately as possible, ensuring that as many entries that may be sought by users are provided, interpreting and applying the various indexing guidelines and standards set by professional bodies and indexing agencies and doing this with a high degree of accuracy and consistency by demonstrating reasonable mastery and competence in the processing of information with the user in mind.

There are truths that make the relationship between indexing characteristics and retrieval performance extraordinarily complex and very hard to test through experiments. According to Soergel (1994:596) important determinants of retrieval performance are not universal but idiosyncratic to the query at hand. Soergel posses the following questions: Does the index language include the descriptors needed to express the query topic? Do the indexers’ judgments in applying these descriptors match the requirements of the query? Does the index language include the hierarchical relationship useful for processing the query?

Index performance depends on the match between indexing characteristics and the requirements of the individual query. The quality of searching plays a major role both in exploiting the strengths of indexing to the fullest and in compensating for its weakness. It is good search practice to adopt the query formulation to the indexing environment for example, to the exhaustivity of indexing. This is the way to ensure the best retrieval possible under the constraints of the given indexing characteristics. Indexing characteristics are not the only determinants of retrieval performance. The retrieval

mechanism also plays an important role. The searcher can do a lot more with a powerful computer search system than with a printed index or card catalogue.

2.2.4.7 Indexing policy

Before an indexing project commences according to Wellisch (1994:622), policy decisions have to be made on: which periodicals to index; what to include from each periodical; term selection; language; depth of indexing; authors' names; titles of articles; and agency. A decision has to be made on whether to index all periodical publications held in the collection, journals only', current issues only and current plus back issues of popular periodicals, and so forth.

Because journals, magazines and newspapers as well as more ephemeral periodicals such as bulletins and newsletters contain contributions of widely different types, lengths and importance, such as articles, newsletters, editorials, letters to the editor, personal news, book reviews, illustrations and advertisements – a decision must be made concerning which of these and other elements may or may not qualify as being indexable. The indexing agency may decide that only a few of them be included in the index. According to Wellisch (1994:622):

- "Articles are the most important part of a periodical and must be indexed. "But what constitutes an article?" he asks and gives the following definition: "It is a contribution that has a title, is signed by one or more authors and is at least one page long."
- Editorials, though most often less than a page long, are also considered indexable.
- Minor news items and "fillers" may be disregarded but personal news, even though brief (nominations to office, elections, awards, prizes, obituaries, etc.) are almost always indexed because they are among the most frequently sought items in a periodical index.
- Book reviews are often indexed by author, title and reviewer, and at least some letters to the editor, especially those pointing out errors and omissions, may

qualify, depending on the nature of the periodical, the information needs of its users and the allowable size of the index.

- Advertisements are often indexed for particular user needs.

Wellisch (1994) recommended that: “whatever indexing policy has been decided upon, it should be followed consistently for at least a number of years, so that users are not being confused by a different choice of indexed items each year.”

Due to the great variety of terminology by different authors for the dissimilar issues even in a highly specialised journal, and the much more divergent topics discussed in periodicals of general or discipline wide nature, it is necessary to strive for a high degree of consistency in the choice of indexing terms, not only for a single volume but as far as possible for those of several years, in order to provide continuity for retrospective searches. This is as important for printed as for electronically stored indexes.

Consistency, according to Wellisch (1994:623), can only be achieved by relying as much as possible on a controlled indexing language, that is a thesaurus, but it does not preclude the uses of an author’s terminology if no suitable thesaurus term is available or a new term is deemed to be important enough to be indexed, at least as a cross-reference. Changes in terminology will inevitably take place and will have to be accommodated for example, wireless *see* radio. The periodical indexer relies most often on an abstract – if provided – that may furnish all or most of the necessary index terms or on the introduction and conclusion of an article, scanning the rest more cursorily and taking into account section headings that may be likely sources for index terms. The exhaustivity of periodical indexes is generally lower than that of book indexes, but their specificity may be higher. The sheer number of articles and the speed at which indexing must be done, particularly for bibliographic databases, precludes in most cases a careful reading of every word in an article from beginning to end (Wellisch 1994:623).

The habit of some authors to sign themselves with only the initials of their given names which may for instance result in more than one Peter, HM or Smith, AB, the last also appearing in a dozen different Romanisation for either the same author or others, is a problem. Other pitfalls in the citing and indexing of names from foreign countries such as transliteration, prefixes and compounding family names have been highlighted in a classic article by Blanken (1971:51).

Titles of articles need not be indexed since they are seldom remembered by users and may be fairly long. They are however, sometimes included in abbreviated form if necessary, in author indexes when this can be done without occupying too much space and if the author index itself is not very voluminous. Key words in titles are indexed and used as search terms.

To some extent, an indexing agency's policies and protocols influence term selection. For instance, a Commonwealth Agricultural Bureaux (CAB) publication outlining the bureaux's indexing policies makes it apparent that term assignment at CAB is oriented towards the production of indexes (Reich & Biever 1991:341): "Indexers assign descriptors for the CAB print indexes first. Additional terms may then be selected for online searching. Descriptors for the printed indexes are assigned and arranged hierarchically, while descriptors in the online database are independent, to be linked by the searcher when appropriate." Wellisch (1994) describes CAB's practice of making policies available to the public as an exception rather than the rule. Although searchers have access to vocabulary control lists, they do not have access to policies driving term selection.

Reich and Biever (1991:337) cite the National Agricultural Library's (NAL) policy, which contrary to the instructions in the CAB thesaurus, requires scientific names for crops before they are harvested and common names after harvest and conclude that if database searchers were aware of this policy, they could make use of the information to increase precision of their searches.

2.3 DEVELOPMENT OF PERIODICAL INDEXING

2.3.1 Early development of periodical indexing

Wittly (1973:193) has offered evidence of the existence of indexes to manuscripts as early as the 14th century. According to his notes on the beginnings of indexing and abstracting, when the printed book became technically feasible in the 15th century, indexes to them were published as well. Periodical indexes were a later invention owing, no doubt, to the paucity of periodicals before the 17th century. In some countries, periodical indexes were not published during those early years for instance, in Russia periodicals were not published until 1703 and not more than a handful existed before 1755. They became more numerous in the 1760s and 1770s. Indexes to this new form of Russian publishing did not appear until the late 18th century. In order to remedy the shortcoming of Russian indexing, AK Storch and FP Adelung compiled an index called *Sistematicheskoe Obozrenie literatury – V techenii Piatiletiia S 1801–1806* (A systematic survey of literature in Russian during the five years from 1801–1806). The index described 232 journals by presenting tables of contents of the journals indexed.

According to Knonick (1991:261), there were no systematic attempts to provide indexes to periodicals almost until the end of the 18th century. This lack of indexing was mitigated by the fact that indexes to review and abstract journals were frequently issued which in effect became indexes to the literature. Knonick (1991) cites the first multi-journal index as: “Cornelius A. *Beughem’s La France Scavente, Id Est Gallia Erudita, Critica et Experionentalis Novissima*, an index that covered nine journals issued in France between 1665–1686. Arranged alphabetically by author, it became a serialised periodical index when Beughem began issuing additional volumes (four in all), covering journals issued up to 1700.”

In general, early periodical indexes produced before 1820 provided no adequate subject access and often required scanning of the entire index in order to find the desired item. Such scanning for the desired item might well have been the intent of the compiler of the index. The periodical literature at the time was not as profuse, scholarship was a

gentlemanly, leisurely activity. Retrieving of specific items on specific subjects in the shortest possible time might not have been an objective of the indexers.

Exactly how the technique of indexing came into being is not known. It however, became evident to scholars and indexers that indexes were useful and necessary in locating periodical articles. Early indexes have by no means been criticised (Anastasevich 1890; Burger 1979) despite this exemplary beginning, the practice of providing indexes, either author or subject, to individual periodical titles were by no means uniform or even characteristic in the 17th and 18th century. Burger (1979:144) observes that although indexes to individual periodicals were useful, they did not serve to bring together articles from different journals. He concludes:

> The idea of printing tables of contents then calling the product an index was not sophisticated. The only way one could find anything in the index was either by knowing in which year and issue an article was printed or by scanning the entire index from the beginning to end. This was a time-consuming and inefficient process that today is still identified as a necessary part of scholarship.

Indexes have continued to be produced this way well into the 20th century in a number of countries.

Anastasevich (1890:36) called for complete indexing of all items in journals. He argued against selective inclusion of journal articles in *Vasilii Sopikov's bibliography.* Instead, Anastasevich would have preferred a complete inclusive index of journal articles. Among other advantages, "it would be easier to become acquainted with all realms of knowledge if a general subject index to articles from various journals were available." The cognitive engine behind the development of indexing is best described in the preface of Archer Taylor's book *General subject indexes since 1948:*

> The compiler of a bibliography is a self-efficacious person with a desire to serve the common welfare who deserves to be judged in a kindly spirit. The compiler of a general subject index has undertaken a task exceeding any man's strength and resources and can justly claim our understanding (Taylor 1966:ii).

In a survey of periodical indexing from the 18th to the early 20th century, Burger (1979) revealed the existence of the same type of self-efficacious persons described by Taylor. Burger (1979:157) consequently adds that, "in view of all the difficulties with which they

were faced, their failures certainly do not deserve our scorn and their successes are even more worth our admiration."

Many early periodical indexers were "gentlemen scholars". As scholars, they saw the need for a bibliographic tool that would free them from the burdensome and often fruitless activity of searching for material on subjects relevant to their interest. Although this practical aim was, according to Burger (1979:146), often couched in language and today might seem idealistic and unnecessarily lofty, "they claimed for instance, that their desired index would help spread enlightenment", their desired goal was the same as that of today's sophisticated information scientist, that is "the recording of all published periodical literature according to accepted conventions in order to minimise the effort required to find it again." One thing that is apparent in the literature about early indexing and indexers' motivation is that they were all sized by the enlightenment spirit and hoped to further the advancement of knowledge and to facilitate the communication of scientific ideas.

2.3.2 Contemporary printed periodical indexes

The present-day printed periodical indexes are either indexes to one bibliographic volume of a periodical or a cumulative volume covering a specific period.

2.3.2.1 Indexes to one bibliographic volume of a periodical

The index to one bibliographic volume of a periodical generally comprising the issues for one calendar year or several years, is either compiled when the volume is complete or it may be compiled for each successive issue, but is only cumulated after the last issue has been finished. It is then printed at the end of that issue, thus becoming similar when all issues are bound, or it may be published in one of the first issues of the next bibliographic volume, unless the index pages are detachable. Some periodicals publish their volume index as a separate booklet which appears weeks or even months after the last issue, featuring a title page and table of contents, and intended to be separated into these parts and bound with the issues of the volume.

Wellisch (1994:620) identified two major problems with indexes to one bibliographic volume:

a There is a large time-lag between the publication of articles and that of the index to them, so that users are deprived of an index to individual issues until the last issue has been published and sometimes much longer. This is a serious deficiency since the bulk of current use and retrospective searching takes place during the first and second year of the appearance of the periodical.

b The compilation of a one-volume index to periodicals is in most cases a task for a single indexer, either a freelancer or a person in the service of a publisher. The quality cannot be guaranteed.

Wellisch (1994:621) cites one horrible example, the 1992 *Annual Article Index* of the prestigious *Scientific American*:

> It consists of a jumble of title entries, sorted by first word, mixed with arbitrarily chosen words, and without any regard to bringing together closely related topics. For instance the term, *modern human originate* [my italics] has been used. Readers of that and other journals aimed at a fairly sophisticated audience are meekly putting up with such shoddy substitutes for detailed and well-designed indexes.

2.3.2.2 Cumulative printed periodical indexes

The volume indexes of periodicals are sometimes accumulated after a certain number of years. The printed five-year accumulation of indexes to *Chemical Abstracts* is an example. It makes retrospective searches very simple. The printed cumulative version of the *Chemical Abstracts* lapsed with the December 2009 volume (*Chemical Abstracts 2009).* With effect from January 2010 the *Chemical Abstracts Cumulative Index 1907–2009* and subsequent issues are available online.

Availability of periodical indexes in electronic databases and the resulting capability of performing retrospective searches limited only by the backward reach of a database have made massive printed accumulations obsolete. Some publishers are contemplating publishing just a few issues of the printed versions or stopping their publication altogether in favour of the online databases (Wellisch 1994:620).

Cumulated indexes from the period before the advent of databases fulfil an important task, and electronically stored indexes have not made cumulated printed ones on smaller scale superfluous. For example, "*The Weekly International Trade Reporter* is indexed every six weeks, with final half-yearly accumulations, a time-lag no greater than that of most databases; other dailies and newsletters from the same publisher have similar current and cumulative indexes" *(The Weekly International Trade Reporter 2009)*. Journals in the humanities and social sciences whose articles often have a longer use-span than those of science and technology sometimes commission cumulative indexes spanning longer time periods, as exemplified by the 30-year *Index to the Journal of Documentation*. According to Anthony (1977:ii), such indexes cannot simply be cumulated from existing annual indexes, even if these are available in machine-readable form, they must for the most part be compiled from scratch. The compilation of even a fairly large cumulated index may be successfully performed by a single indexer but it may have to be done by a team of indexers especially formed for that task, if the amount of material and the time span covered are too large to be undertaken by one person. *The 15-year Cumulative Index to the Weekly Review 1975–1989* (1993), is one such example where librarians around Nairobi were commissioned to index the volumes of the *Weekly Review Magazine* which had been published over 15 years. According to Bliss (1990:149) special techniques have to be devised for such a project.

Terminology changes, sometimes within a decade or less, especially in new fields (Bierbaum & Brooks 1992:98), while many topics indexed mainly in previous annual indexes may now have become obsolete not needing highly specific index terms but only more general ones. On the other hand, it would be a mistake to omit such a topic, however antiquated, because one of the purposes of an accumulative index is to serve as a tool for research on the history and development of a topic. Cumulative indexes take care of terminology changes since they are limited to periods covered by the index.

2.3.3 The development of database indexing

According to Wellisch (1994:620), the information retrieval tool known today as a bibliographic database started in the 1930s in German as *Chemisches Zentralblatt*. It was the first periodical exclusively devoted to the indexing and abstracting of chemical and pharmaceutical literature. At the time the abstracting and indexing (A&I) services and the fields covered by them multiplied in the form of either journals carrying only abstracts and indexes as parts of other periodicals, or as card services and their number reached several thousands**.** With the switch of many A&I services to electronic storage in the 1960s, the term bibliographic database became more popular. Their products are still published both in print and electronic form.

The Online Computer Library Center (OCLC) expanded beyond the traditional library world in the 1990s with the introduction of first search capabilities which provided powerful search capabilities, user friendly in-depth indexing. This however, covered access to selected periodical databases (Bernard & Bordeianu 1993:1). In the electronic environment the indexing function/services have become more sophisticated and increasingly challenging. Indexing of electronic documents and electronic information sources/resources and indexing of conventional documents with the help of electronic methods and tools have been investigated (Sukula 2007:249). Database indexing, Internet and Web indexing have been found to be rapidly responding to changing user needs in the current fast information scenario.

The details about the indexing of periodicals in general and the indexing of one bibliographic volume in particular, according to Hodge (1992:3), also applies to current periodical indexing for a database, except for three major differences:

1 Indexing is being performed by teams of indexers who are trained by the database staff and who must use its custom-made thesaurus.
2 Database provides its indexers with automated aids that perform clerical tasks, support quality control of the index terms and free indexers from routine work, the better to perform their intellectual task.

3 Time-lag between the appearance of a periodical issue and the publication of its index has been reduced to a matter of a few weeks at most.

Web developers generate ever-more impressive innovations. Currently, the Web can deliver experiences that once required costly software, such as Google documents and Adobe Photoshop express. Web crawling search engine bots have moved from simply reading text to recognising images. A programme dedicated to Web-based services and an image recognition engine that is at the cutting edge of search facilities, has been developed (Carr 2008:26).

Some databases according to Ward (1996:217), offer neither indexing performed by human beings nor automatic indexing. Instead, they rely exclusively on the words of full text and on search strategies which extract desired words, phrases, or clauses by a combination of more or less sophisticated methods such as Boolean logic, transaction prefixes, suffixes, or infixes, stemming, proximity commands, weighting and other devices. The burden of indexing is shifted to the users, most of whom are, however, woefully ignorant of the proper use of the retrieval strategies and therefore getting only meagre results if left to their own devices.

Search-inform (searchinform.com) has full text search software that provides database indexing which has been enhanced to include:

- phrase search with due attention to a stemming and synonyms dictionary;
- improved indexing speed from 15GB/hour to 30GB/hour;
- index size of no more than 15–25 per cent of the actual text information volume;
- supporting more than 50 text file formats, including outlook e-mails, MP3 and AVI tags, as well as Microsoft instant messages and 1CQ logs (*Search Inform* version 2.4 2006).

Full text databases are best known and most widely used in the field of law where reliance on the retrieval of certain significant words and set phrases traditionally has been high, but other disciplines of special fields are also covered by non-indexed full

text databases. However, their effectiveness in the retrieval of relevant legal material was found to be no higher than 20 per cent, though it was presumed to be almost 80 per cent by users (Blair & Moron 1985:289). This finding was supported by Wellisch (1994:620), who remarked that “the fact that this study was done about 10 years ago is irrelevant, because the retrieval methods used by the database studied have not changed in principle.” According to him, large bibliographic databases do not use fully automated indexing systems, which are incapable of fulfilling all basic indexing functions. Rather, they employ teams of indexers and provide them with automated indexing aids that are designed to ensure as much as possible accuracy, appropriateness and consistency in the choice of index terms, while freeing the indexers from mechanical and clerical tasks.

2.3.4 Automatic indexing

Automatic and semi-automatic methods have been used for the indexing of periodicals with varying success. There evidently exists a strong and ever-growing incentive to harness machines for the task of periodical indexing. According to Wellisch (1994:620), there are several reasons for this:

- Firstly, the number of articles in periodicals published annually throughout the world is vastly larger than that of books.
- Secondly, the number of people interested in the retrieval of information from these articles is much larger than that of readers of books and most of them need the information within a short period after the publication of the source.
- Thirdly, the topic of most articles is relatively easy to identify from the title, the abstract, the introduction and the conclusion.
- Fourthly, the cost of human indexing is high and its quality is essentially uneven.

The publication of scientific and technical articles and reports in electronic form only – bypassing the slow process of printing – was announced as imminent since the late 1970s. Electronic journals (e-journals) have become conspicuous on the scene of

scholarly communication. There are many reasons this was thought to be impossible at the beginning but the principal one (Wellisch 1994:620), is the inherent and international instability of the text, which could be altered at will by its recipients. Thus while scientists love to communicate with their local colleagues around the world by means of computer bulletin boards and e-mail, they are reluctant to publish their research in a form that can be tampered with and which may be shunned by promotion and tenure committees.

For the same reason, indexing of electronic journals was thought to be an impossible task, giving the protean nature of the text and was described as being unlikely to play any major role in the retrieval of information from a medium that may perhaps partially supplant newsletters but not the printed journal. Nevertheless, computer application to indexing has been developing very fast. Thus, Thomas (1984:81) observed that those who had acquired computers and/or word processors were adding more storage capacity (6, 8, 10, or even 20 megabytes) with the same aplomb with which they would only have purchased a thousand 3”x 5” filing cards. Libraries nowadays subscribe to full text e-journals which are available online.

There are now computer programmes, which can make intelligent summaries of documents, typed or scanned into them or taken from the Internet. A good example of an automatic summariser is the object analyser from In TEXT (1995):

- The object analyser identifies the major information content of large documents and creates precise synopses of these documents.
- Using In TEXT’s unique heuristic technology, object analyser understands the “aboutness” of documents and deduces the most important information on the fly.
- No front-loading of dictionaries or index building is required.
- The object analyser automatically creates summaries from 1 to 99% of the original.

- The object analyser performs analyses by reading the entire document and objectively rating every word, phrase and sentence by its contribution to the document's central theme or themes.
- While the object analyser's content knowledge is built-in and domain independent, it can also be tuned to make more accurate and comprehensive extractions from documents associated with particular topics and disciplines, for instance, medical terms can be added and dynamically called upon during document analysis.

Presently, a number of browsers on the World Wide Web offer the facility of automatically summarise texts and some texts have been adopted for text bases outside the Web, such as POWER LINK. Holding full texts in the text base is now possible as software becomes cheaper and the technology improves. Full text bases solve a number of information retrieval problems as they enable us to offer a much more comprehensive form of retrieval and a much more convenient form of document handling. Summaries of documents are still required and the use of automatic summarisers is real according to Ward (1996:217).

The summariser, according to its creator (Jones 1996:220) has the following advantages: it can read the whole text virtually instantaneously; it is claimed to be more consistent than the human indexer and it is unbiased. Some of the disadvantages of the summariser as Jones puts it, are being offset by future developments, for instance, developing ways of stopping redundant text (compacting texts) and considering more than a single text (collection clustering), which may reveal connections which are inaccessible to the human indexer.

According to Valauskas (1994:101) computers have all the traits best suited for text retrieval, including character-based analyses and speed. On the other hand, most human memory-based search and retrieval engines rely on inefficient clues, such as paper texture, colour, graphics and even the smell of some issues. Computers usually depend on human-invented indexing systems to locate text, although products such as

Apple Search are altering this potential deficiency. Library catalogues were taken to task for being the wrong solution to the right problem for general information discovery. According to Tennant (2004:28), the federated or cross-database search tools now available on the market, are the current solution for unifying access to a variety of information resources. These tools can search not only library catalogues but also commercial abstracting and indexing databases, Web search engines and a variety of other databases, while merging and de-duplicating results. While some libraries may be happy with doing a minimum amount of configuration to the “out of the box” interfaces of the products, a significant number of libraries will not.

Indexing that provides cross references to conceptually related topics, is now available. However, indexing performed exclusively by machine that will analyse a text and produce index headings that are modified by subheadings for related topics scattered in the text augmented by index terms for topics only implied but not expressly stated in the text, is at present not available and was, according to Wellisch (1994), unattainable. A decade later, search systems that incorporate term hierarchies derived from mark-up structures have been developed in which term hierarchies are automatically constructed for the entire document collection and then applied to assist a user in the search process. The United Kingdom (UK) search for instance, can run on different document collections without the need for manual modification (Kruschwitz & AI-Bakour 2004:599). It is now possible to search and download contents of databases provided you are an authorised subscriber since full text for most periodicals is available online.

Many of the papers describing new techniques and descriptors for content-based image retrieval describe their new proposed methods as the most appropriate without giving an in-depth comparison with other methods. An overview of a large variety of features for content-based image retrieval is given and they compare quantitatively on four different tasks: stock photo retrieval, personal photo collection retrieval, building retrieval and medical image retrieval (Deselaers, Keysers & Ney 2008:77). According to them, the colour histogram performs well in comparison and is recommended as a simple baseline for many applications.

To effectively utilise information stored in a digital image library, effective image indexing and retrieval techniques are essential. Teng and Lu (2007:3299) proposed image indexing and retrieval techniques based on the compressed image data using vector quantization (VQ). By harnessing the characteristics of VQ, the proposed technique is able to capture the spatial relationships of pixels when indexing the image. Experimental results illustrate the robustness of the proposed technique and also show that its retrieval performance is higher compared with existing colour-based techniques. A novel automatic query reformulation technique based on shallow syntactic evidence induced from various language samples used to enhance the performance of an information retrieval system established that, shallow syntactic fragments of high frequency generally correspond to lexical fragments of high content and to be an effective automatic indexing method (Lioma & Qunis 2008:143).

Libraries with academic portals index information of interest to their students and staff to develop their repositories. The main concern of the campus portals is the quality of data and information they provide for their users. The users are directed to the information they need (Hejazi & Dilmaghani 2005:4). An academic portal specifically centred on abstracts and abstracting resources has been proposed (Pinto 2008:667). The resulting cyber abstracts portal presents its products consistently and includes reference, abstract, keyboards, assessment and access to the full document. This subject-based gateway represents much more than a mere subject catalogue.

The University of Newcastle (United Kingdom) was the first customer to license *Scopus* in the Asia Pacific region. *Scopus* is a navigation product from Elsevier and is the world's largest abstract and indexing database covering 27 million abstract citations from over 14 000 Social Science journal titles and conference proceedings, from over 4 000 international publishers. Navigation through the available scientific libraries is enabled by means of new searching and browsing functionality (University of Newcastle 2004:344). The *Scopus* abstract and indexing database was launched at the Science Museum in London, England in November 2004 (Scheweikert & Smith 2004:22).

Scopus has since made great strides including the addition of seven million archive records in early 2007 and the agreement with *ProQuest* to link through to its Arts and Humanities selection (Hoogendom 2008:227).

2.3.5 The future of the human indexer

The major implication in the development of indexing, particularly in automated databases, has been the possibility of replacing the human indexer with machines. Replacing human indexers with specialised software has been assessed by a number of investigators (Bell 1992; Farrow 1991; Jones 1992; Todd 1992; Ward 1996; Weiner 1986; Weinberg 1988; Wellisch 1994).

With particular reference to the object analyser from the In TEXT automatic indexing system and applying the criteria described for human indexers, Ward (1996:217) established that, unlike the human indexer, the summariser has the following disadvantages:

- it works on individual documents only;
- it cannot relate texts to each other or to a review of the word;
- it is tied to the vocabulary and grammatical usage of the document summarised;
- it cannot deal with foreign languages;
- it cannot evaluate texts;
- it cannot create inter-textual links;
- it is condemned to index what is there, it cannot index what is implied;
- it cannot imitate the questing, human response to a text which adds value to the indexing;
- it would require constant tuning to keep up with new developments;
- it cannot catalogue or classify.

Ward aimed to consider the principles of indexing and the intellectual skills it involves, so that it may be clearly seen what the automatic indexer would have to do to supplant or complement the human indexer. He urges that good indexing at least in his technical

field, requires considerable prior knowledge of the literature, judgment as to what depth to index it, reading skills, including the ability to deal with non-verbal data, the analysis and evaluation of texts, the creation of an abstract, including the information of inter-textual links and the cataloguing and classification skills necessary for text base creation. Ward (1996:218) consequently concludes that “at present, it is unlikely that automatic indexers will replace human indexers but when more primary texts are available in electronic form, they may be a useful productivity tool for dealing with large quantities of low grade texts (should such material be wanted in the text base).”

In a paper on indexing models, Farrow (1991:149) notes the distinction between “bottom-up” perceptual operations and those which are “top down” and conceptual in nature. Object analysers according to him, can only make a usable abstract by working “bottom-up” within the world-of-the text. Farrow then wonders though, whether even in the most “bottom-up” analysis, a degree of vision and common sense will not produce a better and richer result and insists that indexing requires judgment, analysis, knowledge, sensitivity and commitments and also the involvement of some intellectual operations. Weinberg (1988:5) explains that it is what is said that counts, not merely what is referred to, differentiate as “comment” and “topic”. Computers are incapable of any sensitivity to the “Ah!-factor” but can only adjudge either the presence/absence of words.

Bell (1992:192) maintains that the principle of choice here is subjective, depending on the indexer’s/reader’s response to the text – and such a response is difficult to quantify. The computer can only be sensitive to the degree of own reaction, awareness or relevance, of interest in its dictionary sense of immediate concern. These, he adds, can be related to Weinberg’s Ah!-factor. The creators of the computer programmes say they cannot supplant a professional human indexer (Jones 1992:2). Todd (1992:101) observed that more interest was being shown in automatic indexing than in improving human indexing. Essentially, the subject analysis phase – also known as the conceptual analysis phase – is lamented as an intellectual operation resistant to investigation. This lack of focus on the cognitive processes of indexing in discussion and research has

contributed to an inability to provide suitable search terms which affect retrieval of relevant information during searches.

However, over the past few years the subject analysis phase/conceptual analysis/cognitive processes, etc, have been the main concern of professional indexing societies the world over (eg ASI (USA), ISC/SCI (Canada), ANZI (Australia and New Zealand), SI (Great Britain)), ASAIB (South Africa), and so on – and at almost all indexing conferences these issues are addressed and even workshops conducted on conceptual analysis. There is also an ISO standard drawn up for indexing principles whether manual or automatic (Indexing Standard ISO1999:999). Training in basic indexing is also in focus (to enhance the conceptual phase; to apply international standards) and includes manual as well as computerised indexing, metadata, and so forth. One has to consider the principles and intellectual skills involved in order to determine what automatic indexing systems would be required to supplant or complement the human indexer.

Web indexing Special Interest Groups (SIGs) are being established to focus on various aspects of indexing. Two such groups are: periodical and database indexing and taxonomies and controlled vocabularies (SIGs 2007:112). The periodical and database indexing SIG is a discussion group of the American Society of Indexers whose members are individuals with an interest in or background of indexing of periodicals and databases. They work as freelance or in-house indexers for periodicals, on contract or are in-house workers for database companies. The taxonomies and controlled vocabularies SIG is a group of the American Society of Indexers' taxonomies and controlled vocabularies Special Interest Group whose members are individuals with interest or background in indexing, who create or edit taxonomies for external clients or audiences, either as freelance/consultants or as in-house developers of taxonomies/controlled vocabularies for externally offered (sold) information services. Individuals who are not members of the American Society of Indexers but are regularly involved in taxonomy/controlled vocabulary work may join the discussion group on a case-by-case basis, approved by a moderator (SIGs 2007:112).

A new periodical/database of SIG was approved by the American Society of Indexers (ASI) in May 2008. Its mission is to provide a discussion space where members can communicate with others who are interested in periodical and database indexing; to share knowledge and expertise with new indexers interested in periodical and database indexing; to make periodical and database indexing more visible in the indexing world and to make database companies and periodical publishers aware of qualified members when they are looking for indexers (SIGs 2008:119). The marketing plan for the American Society of Indexers focuses on three major areas: marketing the society, its events and its products and services; marketing indexing as a profession; and helping indexers learn to market their own services (Leise 2008:78).

The current consensus is that the human indexer remains supreme. As Wellisch (1994:620) puts it, it should be obvious that algorithmic indexing, that is, the extraction of terms from machine-readable texts by various automatic methods cannot, in and for itself, produce an index capable of fulfilling all required functions. This can only be achieved by application of suitable search strategies, even then, some functions such as the distinction between a significant topic and mere passing mentions of it, can be realised only partially or not at all. It is also often necessary to index terms that do not actually appear in the text, yet they are needed to lead users to topics that are only implicitly expressed. This phenomenon is encountered only relatively seldom in scientific and technological texts and has therefore been disregarded or swept under the rug in the voluminous literature in automatic indexing where the focus has been largely on science and technology.

However, in the indexing of the humanities, particularly in philosophy, history and literary criticism, as well as in the indexing of biographies and narrative prose, the provision of terms not found in the text but only implied is often crucial for the effective retrieval of topics by means of an index. Terms for implied topics can be assigned only by human intellectual effort since no algorithm or artificial intelligence device can generate terms that are not in the text itself, concludes Wellisch (1994:621). The

unlimited richness, variety and complexity of human language and its ever-changing use by originators and recipients of verbal messages preclude any kind of fully automatic indexing to the same extent that full automatic translation has long since been recognised as an impossible dream. Organisers of video testimonies found that speech-recognition technology would not work for indexing at the University of Southern California's extensive video archive of holocaust testimony and turned to the human touch and a system that could be used for other larger collections (Carlson 2007:A32).

A study of some artificial intelligence methods for automatic indexing ruefully stated that the major limitations of "these systems is that they are restricted to indexing material from very narrow domain. A fully automated indexing system that operates without human intervention and indexes general text has not yet been developed, mainly owing to the difficulty in representing commonsense knowledge" (Schuegraf & Van Bommel 1993:33). A statement by Saracevic (1991:341) best summarises the future of the human indexer, namely that "the costly and unreliable 'devil' in the shape of human indexer has been exorcised, but he/she returns through the back door in the shape of equally costly human intermediary whose help is needed by most users of full text databases."

The growth of the Internet has provided indexers with a wealth of resources on their desktops. By book-marking appropriate websites in their browsers, indexers now have desktop approach to a wide range of reference tools: thesauri, databases, dictionaries, related information, statistics, in all subject areas, accessible at any hour of the day or night (Weaver & Wyman 1999:103). The place of the human indexer in particular for periodicals covered by databases seems secure, while more and more of their intellectual abilities will be put to good use by relieving them of tedious and repetitive tasks that are performed better and quicker by machines. A state of affairs envisaged by the father of cybernetics, Norbert Weiner, who in his book coined the phrase "the human use of human beings" (Weiner 1986). The concept of indexing has been described as widening and the great variety of practices associated with the nature and the context of documents to be indexed has been found to have a positive and

significant impact on the role of information professionals. This is why manual indexing continues to be relevant today and in future and should be harnessed together with automatic indexing techniques (Menon 2004:340).

2.4 INDEXING PRACTICE AND USAGE OF PERIODICAL LITERATURE

As more and more documents become available on the Internet, finding documents that fit users' needs from databases containing millions of documents is becoming increasingly challenging. Yen-Liang *et al* (2007:492) investigated fonts, position and cited references and discussed how to integrate these three together to improve retrieval performance. They investigated relationships among them and used these features to design a novel retrieval method based on the discovered relationships. The empirical results show that using the location factor alone achieves the same performance as considering location and font factors simultaneously. It was also observed that citation similarity is useful only when the similarity is high. Since a scientific document is a structured text, it has some useful features that can be used to improve retrieval performance. Based on these two clues, a method to combine the content and reference vectors conditionally was developed and as a result, this integrated approach does indeed, improve search performance.

Interdisciplinary research offers information challenges for researchers, scholars and librarians, which calls for federated searching strategy (Lura 2007:56). This broad search strategy is used in order to recover most of the relevant information for the whole discipline from a number of databases for one publication year in order to avoid problems encountered when using sampling and example searches.

In a paper on the problem of content search in highly distributed and dynamic environments, a distributed model built upon a peer-to-peer network which supports complete indexing of text documents and allows searching by content was proposed and evaluated. A distinctive feature of this proposal is that it requires no specific network topology or hierarchy. Evaluation of retrieval performance using a test

collection showed that the peer-to-peer system was able to achieve the same level of performance as the centralised system (Tolosa *et al* 2006:176).

A structured mechanism for Web search evaluation that points to useful scientific research and shows how information practitioners can use these methods in evaluation of search on the Web for their users has been put forward (MacFarlane 2007:352). The approach utilises traditional laboratory-based evaluation measures such as average precision at N documents, augmented with diagnostic measures such as link broken, etc, which were used to show why precision measures are depressed as well as the quality of the search engines crawling mechanism. The findings of the study (MacFarlane 2007:366) shows how to use diagnostic measure in conjunction with precision in order to evaluate a Web search and the implications for information professionals who regularly use a Web search as part of their information seeking and need to evaluate Web services and conclude that the use of diagnostic measures is essential in Web search, as precision measures on their own do not allow a searcher to understand why search results differ between search engines.

A theoretical framework for handling multiple contexts in information retrieval through poly representation has been offered. Supporting the principle of poly representation results of a study have shown that in general overlaps generated by three or four representations of a different nature have higher precision than those generated from two representations or the single fields (Skov, Larsen & Ingwersen 2008:1673). A highly structured query language is necessary when implementing the principal of poly representation in a best match information retrieval (IR) system because the principal is inherently Boolean.

In order to improve on multimedia retrieval performance, an XML retrieval INEX 2007, a multimedia information system with a XML structure that provides a logical level at which multimedia objectives are connected, has been explored (Tsikrika & Westerveld 2008:16). It provides an evaluation platform for the retrieval of multimedia documents and document fragments. The platform creates a discussion forum where the

participating groups can exchange their ideas on different aspects of the multimedia XML retrieval task, multimedia documents and documents' fragments.

A document similarity search (ie query by example) has also been suggested (Wan, Yang & Xiao 2008:1032). This aims to retrieve a ranked list of documents similar to query documents in a text corpus or the Web. The pair wise similarity score between each document and the query are computed using a retrieval function or similarity measure and then ranked by similarity scores. Using a block of coherent text about a subtopic to re-rank a small set of documents initially retrieved by some existing retrieval function – a novel approach based on manifold ranking of blocks – has been proposed. The proposed approach can significantly improved retrieval performance over baseline approaches.

Query expansion (QE) has been described as one of the most important mechanisms in the information retrieval field (Abdelali, Cowie & Soliman 2007:705). According to them, a typical short Internet query will go through a process of refinement to improve its retrieval power. Most of the existing QE techniques suffer from retrieval performance degradation due to imprecise choice of a query's additive terms in the QE process. In their study Abdelali *et al* (2007) introduced a novel automated QE mechanism. The new expansion process was guided by the semantic relations between the original query and the expanding words, in the context of the utilised corpus. Experimental results of the "controlled" query expansion, using the Arabic TREC-10 data, showed a significant enhancement of recall and precision over current existing mechanism in the field.

Document length is widely recognised as an important factor for adjusting retrieval systems (Losada & Azzopardi 2008:109). Many models tend to favour the retrieval of either short or long documents and thus a length-based correction needs to be applied to avoid any length bias. "Stemmers" attempt to reduce a word to its stem or root form and are used widely in information retrieval tasks to increase the recall rate (Melucci & Orio 2007:673). A clustering-based approach was used to discover equivalence clauses of root words and their morphological variants. The proposed approach was compared

with Porter's and Lovin's stemmers on the AP and WS sub-collections using 200 queries (Majumder *et al* 2007:18). Its performance was found to be comparable to Porter's and Lovin's stemmers, both in terms of average and precision and total number of relevant documents retrieved. The proposed stemming algorithm also provides consistent improvements in retrieval performance in other languages.

A study investigated information retrieval (IR), using a large-scale test collection that contains 408 305 documents and 72 ad hoc queries, by examining affects of several stemming options and query document matching functions on retrieval performance (Can, Kocberger, Balsic, Kanyak, Ocalan & Vursavas 2008:407), and showed that a simple word truncation approach that uses language-depended corpus statistics and an elaborate lemmitiser-based stemmer provide similar retrieval effectiveness in information retrieval (IR). The study also investigated effects of a range of search conditions on the retrieval performance, these included: scalability issues, query and document length effects; and use of a stop word list in indexing. The setting of the term frequency normalisation hyper-parameter suffers from the query dependence and collection dependence problems, which remarkably hurt the robustness of the retrieval permanence.

HE & Ounis (2007:1) investigated three term frequency normalisation methods namely: normalisation 2, BM25's normalisation and the Dirchlet priors normalisation and established a query dependence problem by modifying the query term weight using a divergence from a randomness term weighting model and tackled the collection dependence problem by measuring the correlation of the normalised term frequency with the document length. The hypotheses were extensively validated.

Latent semantic indexing (LSI) can be used in patent searching to overcome drawbacks of Boolean searching and to give more accurate retrieval. LSI combines the vector space model (VSM) of document retrieval with single value decomposition (SVD), using linear algebra techniques to uncover word relationships in the text. According to the study, these results can be enhanced by using text clustering and tailoring SVD

parameters to the specific corpus, in this case patents, and employing techniques to address ambiguities in language (Ryley, Saffer & Gibbs 2008:238).

An information retrieval performance measure interpreted as the percent of perfect performance (PPP) can be used to study affects of the inclusion of specific document features or feature classes or techniques in an information retrieval system (Losee 2007:1020). Using this technique, the relative quality of a new ranking algorithm can be measured. The result of incorporating specific types of metadata or folksonomies from natural language, or determine what happens when one makes modifications to terms such as stemming or adding part-of-speech tags. According to Losee (2007), removing stop words in a specific system improves the performance by 5% and leaves 95% of the possible performance to be obtained using other methods. The PPP measure is based on the average search length, a measure of ordering equality of a set of data and may be used when evaluating all the documents, or just the first N documents in an ordered list of documents.

As Holmstron (1978) pointed out, however well versed in the subject matter of any periodical its indexer may happen to be, he/she cannot foresee what items at some future date could be of interest to some individual reader and that there is a case for scientifically controlled investigation aiming to correlate different styles and details of indexing with the opinions formed by the index users. Thus, the indexing practice and information needs of researchers, existence and reasons for non-use of indexing services and the need for indexing for users have to be appreciated and addressed by indexing agencies for maximum usage of periodical literature.

2.4.1 Indexing practice and information needs of researchers

Studies of information needs have shown that researchers feel that some relevant literature is passing them by and that they experience instances of late detections (Ford 1977) and yet, most do not use indexes to help identify these papers, why? Whereas the student or layman is looking for literature on or about a topic, the scholar's or researcher's information need is in most cases substantially different. This group of

users deals in ideas and theories, and wants to know whether specific ideas have previously been expressed in literature (Weinberg 1988:4). Whereas book indexes feature coined modifications which in theory, precisely identify the aspect of a topic being treated by Borke and Bernier (1979), the predetermined lists of subdivisions in periodical indexes do not permit or provide point-of-view of the topic.

A study by Sewell and Teitelbaum (1986:234) has shown that subheadings in MeSH (medical subject headings) are under-utilised by end users. Thus, even where the relatively sophisticated treatment of aspects exists in an indexing system, its complexity may militate against its use by researchers. The essence of the problem is that indexes focus on “aboutness” while neglecting aspect, the linguistic analogues of these notations are topic and comment respectively. In a particularly felicitous explanation of these terms, Lyons (1995) defines topic as the “subject of a discourse” and a comment as “that part of the utterance which adds something new and thus communicates information.” It is contended that the scholar/researcher is primarily interested in comment and an index limited to identifying the literature about a topic with only broad sub-categorisation is next to useless for the scholar’s purposes.

Hutchins, in a linguistic analysis of “aboutness”, uses the terms *theme* and *rhyme* for topic” and “comment”, respectively (Hutchins 1978:172). The distinction he draws is that the novice is interested in documents *about* a topic, while the scholar is interested in those that provide new information *on* a topic, with the basics of which she/he is already familiar. This is a perceptive observation, but it is felt to be useful primarily for selective dissemination of information as opposed to retrospective searching of the published literature for a highly specific research topic.

Key writers on information requirements have shown that the effectiveness of indexes tend to be influenced by specificity, post co-ordination, exhaustivity and index depth, among other factors.

- *Specificity*

Weinberg (1988:5) suggests that increased specificity in indexing is what the researcher needs. The discussions of this concept in the literature of library information science tend to focus on specificity in naming the topic, however e.g. “roses” versus “flowers” and not the aspect. Moreover, the true scholar in a discipline tends to be concerned with a relatively general topic. For example, the luminaries of our discipline frequently write on theories of information or indexing. Their works are differentiated by the points-of-view they bring to the topic.

- *Post co-ordination*

As more periodical indexes become available online, the use of subdivision in indexing is decreasing because of the possibilities of post co-ordination. Schuyler (1987:44) in her review of Lancaster’s new manual on thesaurus construction, notes that the topic of subheadings is not treated at all. Subdivision is being abandoned by abstracting and indexing services, even where the same indexing data appears in the printed tool, which requires pre-coordination (Milstead 1984:216). While post co-ordination works for a set of concrete topics such as “libraries in universities”, it does not work for theories and aspects of a general topic that are not easily named in distinctive terms.

Libraries have established a controlled, mutually understood vocabulary to adapt to a growing focus on information services in the field, but these keywords are not recognized by other bibliographic platforms. Attempts have been made to negotiate between automated and human indexing using key phrase-extraction algorithm (Coyle 2008: 530).

- *Exhaustivity*

Indexing exhaustivity plays an important role in shaping the document space, with higher exhaustivity resulting into the lowest document-space densities. The impact of term frequencies, term distributions and indexing exhaustivity on representation of document spaces in a visual vector-based retrieval environment is investigated in a

study demonstrated that singly occurring terms contribute significantly to defining the document space density, which has implications for the retrieval of documents (Wolfram & Zhang 2001:21).

The researcher would like to know whether an idea that may not represent that major focus of his/her paper has previously been expressed in the literature. It may be suggested that this is a problem related to the exhaustivity of indexing, or depth of analysis. Whereas exhaustive indexing is not considered practical in printed indexes, full text databases are touted as offering the solution to this problem. These are useful for locating highly specific terms or jargons that have not been incorporated into thesauri, but are very poor for searching an idea or aspect of a topic that may readily be paraphrased in numerous ways. Exhaustivity is closely related to the concept of indexable matter. Indexable matter in journals includes: articles, reviews and perhaps editorials.

- *Index depth and specificity indexing*

As Lancaster reports, indexing depth and the specificity of the indexing language are two principal factors affecting recall and precision in any retrieval system (Lancaster 1986:168). The study found that an inadequately specific vocabulary will produce search results with low relevance ratio and will affect recall in those cases where there are no terms to describe significant concepts. However, the indexer is the person who decides on the number of terms necessary to characterize a document adequately and is independent of vocabulary control.

Indexing depth influences the number and sometimes the choice of terms assigned to a document, but it is not a function of the index language. Depth indexing may play an additional role as it may influence the choice of terms. A detailed analysis of a document may lead an indexer to use a number of specific descriptors in lieu of generic terms (Reich & Biever 1991:336).

2.4.2 Non-use of indexing services

There exists evidence to suggest continued the non-use of indexing services by some researchers. A variety of reasons have been given for non-use (Moors 1960; Butler 1983; Breton 1981; Swift, Winn & Bramer 1978; Weinberg 1988).

Probably, the oldest one is Moor's (1960) law, which essentially states that an information system will not be used when it is more trouble than it's worth. Motivation and complexity enter into Moor's law, but even a system that is easy to use will not be used if it identifies an excessive amount of literature on a topic for the researcher to scan, without zeroing in on the aspect of interest. Butler (1983) explained the non-use of indexes in terms of information avoidance. According to him, researchers would not avoid databases if they afforded fast answers to their questions, which a number do not do. Breton (1981:20), in a paper on why engineers don't use databases, explained that indexes in the field of engineering specify concrete topics, but not the concepts that are important to the researcher, ie functions and attributes. Breton's idea may be generalised to include humanities and social science scholars who do not find adequate indexing for their fields, as well as the researcher in soft sciences, dealing with such slippery phenomena as information.

Swift et al (1978:182) noted the limitations of indexing based on "aboutness" for the field of education and recommended a "multi-model" approach to indexing which would record a theoretical orientation and research method in addition to the topic. They concluded that probably, the only scientists who were reasonably well served by indexes were those involved in experimental research examining the relationship between two concrete topics such as smoking and lung cancer. However, if such a scientist wants to know whether anyone has ever posted a particular theory explaining the relationship between the two phenomena, he encounters the same problem as his counterpart in the humanities. Weinberg (1988:3) explains some of the limitations of standard indexes to the periodical literature and reasons for their non-use in his paper on why indexing fails the researcher. According to him, one could conceive a variety of mechanisms to improve indexing for researchers. There is a great deal of subjectivity

involved in distilling the essentials of a research paper and in identifying the new ideas contained in it. But even in cases where all agree that an abstract is an accurate representation of a document, we are still dependent on indexes for providing access to them. In Weinberg's view, these comparisons or distillations of the literature often miss the key point or omit major points. Indexes, according to him, fail the researcher because they do an inadequate job in representing the aspects of topics and its conclusion is, "for the researcher there is no substitute for extensive reading and a prodigious memory" (Weinberg 1988:6).

As a result of the non-use of indexes, we see many poorly documented papers even in our own field – information science – where the researcher theoretically knows how to make effective use of such tools. Poor citation practices are explained in part by Garfield (1977) ie that generally accepted ideas become part of the conventional wisdom of a discipline without formal citation to the originators. There are no sanctions for non-acknowledgement of prior ideas, however, except for outright plagiarism and lack of citation of a journal referee's relevant papers may give a prospective author trouble through! More often an author would like to acknowledge an intellectual debt, but does not recall where he first read an idea and realises that it would take too long to research it through indexes. An example of this may be found in Kochen's paper (1987) entitled *How well do we acknowledge intellectual debts?* The entire parenthetical anecdote is worth quoting here: "There was a good article in the early days of information retrieval discipline – perhaps in the early 1960s – that demonstrated how an error in citation was propagated by uncritical, unchecked copying from one bibliography to another." The inability to recall or retrieve the citation to this article is an example of retrieval failure, even given strong clues.

2.4.3 Indexing for users

Indexes are compiled strictly for users, taking their needs primarily into account. Stirk (1988:76) offers herself as the archetype that, "as someone with an inquisitive mind I am an inveterate "looker-up" and, therefore, a frequent user of indexes … through an index I expect to answer any question, and the index to be geared to my particular

needs." But users come as different types, at different levels, with differing expectations and expertise. They have their own peculiar requirements. The indexer must assess the likely readership for each article, selecting terminology to suit it.

While indexers are taught to ignore merely trivial mention of topics in the text, for particular groups or users, these may just be the object of the search. For instance, "a historian speaking at the SI conference held in Edinburg in 1990, Rosalind Marshall, begged indexers to include in their indexes names of all people mentioned, including the most minor references to servants in the backyard, to help researchers such as herself" (Bell 1996:4). These, according to many indexers would be wanted by only a tiny minority of readers and would clutter up the index for the rest, consuming space.

Indexers' contemptuous dismissal that: "no one would want to look that up", may unhappily be applied to large passages of articles which one finds trivial or silly" (Bell 1996:5). The criterion of worthiness of inclusion in the indexer's eyes might lead to blank pages where the index was planned to be. Bell's view is that indexers must assume that since the article has found a publisher, some people out there must be going to value it.

It has been claimed by the chairman of the committee that revised the British Standards on indexing in 1988, that they took particular account of the needs of users of indexes (Bakewell 1988:42). Occasions have however, been recorded when the indexing rules have mislead the user. Beare (1984:10) wrote about a discrepancy between abiding by rules or helping readers that she encountered in compiling an index to the *Strand Magazine* that, "well, the mind boggles! It might be correct to do all this, but it does take up precious space and could cause annoyance to the user."

As Frances Lennie of CINDEX (1994) puts it, "we're not building an index to abide by the rules of the index. We are building an index to serve the reader." Stirk (1988:75) observed that there are rules for strict alphabetical order, "but this is not a panacea answer to user's problems … what laymen would know these rules?" Teaching the rules

to laymen and all is no help, it appears. The British Standard recommendations for preparing indexes to books, periodicals and other documents (BS 3700:1988:255), stipulates that:

- "The choice of concepts to be named in the index depends on the expected needs of a user…"
- "Entries should allow for different approaches likely to be made by the user…"
- "The index should be constructed according to a logical, balanced and consistent pattern, easily recognizable by its potential users …"
- "The quality and consistency of an index will be enhanced if the indexer … is fully briefed as to the likely requirements of the potential users of the index."

The consensus in the literature is that indexers should strive towards compiling indexes that would meet user requirements, since they are indexing for users. The challenge posed in the literature to the indexer is catering for access to information for users whose needs are varied, and researchers whose aims and objectives are diverse while obeying indexing standards set by various local and international bodies.

2.5 IN-HOUSE INDEXING

This section provides a background introduction to in-house indexing, the need for in-house indexing, and factors necessary for the success of in-house indexing project.

2.5.1 Introduction

Secondary literature exists for most areas of knowledge in that one can expect comprehensiveness, accuracy and usually, ease of use, at least for librarians. However as pointed out by McTeigns (1989:402) the cost of many published abstracting and indexing tools is too great for a lot of libraries. Some have taken to in-house indexing in the absence of any form of index to their periodical collection. For example, their staff and users struggle with cheaper un-accumulated bulletins or rely on home-grown records of varying efficiency to search their own holdings of journals. The commonest in-house approach has involved listing articles under alphabetical subject arrangement of some kind, often located in the book catalogue though rarely integrated with it. All the

problems bedevilling exclusive reliance on subject indexing attend these files: ambiguity, omission of some alternative sought terms and degree of specificity.

By scanning and indexing periodicals as they arrive, an up-to-date, rapidly accessible index to them is created to achieve the information retrieval role more effectively. McTeigns (1996:20) urges that unless one subscribes to a very large number of journals and as long as one has reasonable guidance in the subject index, little time is taken making the entries. Those who run a selective dissemination of information (SDI) programme may find that they can combine scanning for it very easily with the indexing system. The system creates an accurate and highly current locating tool.

2.5.2 The need for in-house indexing in university libraries

The act of indexing for an institution, according to Ward (1996:217), is a point on which the life and culture of the institution converge. Ward makes two points that emphasize the need for in-house indexing:

- When engaged in indexing for an institution, we reflect the institutional mind. We can only do this through commitment and identification with the institution.
- The indexer has an important gate-keeping role in the institution, as it is sometimes not until indexing commences that the significance of articles can be appreciated, directing relevant ones to an awareness service for researchers and teaching staff and so forth.

During a seminar on the promotion of a reading culture in an academic environment held at the University of Nairobi Library, Professor Simiyu of the History Department (1999) remarked: “I used to get information on new periodical articles in history during the time of the late Reuben Omwakwe (a renowned senior librarian who worked at University of Nairobi Library between 1961 and 1988). This is no more. What has happened?" He lamented! “Even when I visit the library, I don’t get such information in catalogues. What would bring me there?” The late Omwakwe had developed a small in-house index covering contemporary issues on art-based disciplines. Clearly, the

statement manifested a need to establish an in-house indexing and SDI service in the library.

Several existing examples of the need for and evidence of in-house indexing of periodicals in university libraries have been cited in the literature (Richardson 1988; Kilcullen & Spohn 1996; Cramer & Markland 1989; McAdams *et al* 1985). The builder project based at the Institute of Historical Research of the University of London was, according to Richardson (1988:85) intended to create a comprehensive cumulative index to the entire contents of the *Builder*, the most important architectural journal of the Victorian age which readers at the university had been requesting for many years. The decision to index the *Canton*, a local newspaper, according to Kilcullen and Spohn (1996:16) – both librarians at Kent State University (UK) – was in response to an observed need. Thus,

> …although Canton, Ohio surrounding area is rich in local history, the libraries and historical societies lacked easy access to the basic historical information about local events, people, government and politics. Information about historical events and characters could sometimes be located in a six volume set entitled stark county history. However, the information contained in this work would merely hint at the answer. There was no convenient access to the area's unique history.

Clearly, what was needed was a comprehensive index to the information found in the local newspaper. Kilcullen and Spohn (1996:6) chose the newspaper –*The Canton Repository* – as the initial project because it had been consistently published since 1815 and because of the industrial importance of the county. An index to the paper was considered to be of considerable historical significance. The index would provide community access to information that had been virtually impossible to retrieve, additionally it would serve as an educational and community tool for the residents of Stark County, Ohio. The extent of other indexing projects was confined to personal names and select subjects of interest. Kilcullen and Spohn knew from the onset that the index would not only interest the Kent State University but also the area public, academic and special libraries as well as local historical societies. Eventually, interested libraries would either be sent a printed index, or have electronic access to the index. The index is at present available on the Internet.

The PubMed service launched in June 1997 provides free *MEDLINE* access via the World Wide Web. Over 9 million medical articles from 70 different countries are available for searching, with more than 1 000 articles added to the database each day. Access to their information is made possible by the diligent work of 44 National Library of Medicine (NLM) indexers/services and about 50 contract indexers. The hiring of indexers, training, mentoring and revising is critical for database indexing (Ochej & Wyman 1999:67).

Cramer and Markland (1989:807) cite the innovative indexing method began in 1985 by the university libraries at Virginia (Virginia Polytechnic Institute and State University) to gain better access and control of local newspapers. McAdams *et al* (1985) have cited a major indexing programme launched in December 1984 at the University of Stratchclyde's Department of Information Science by *Glasgow Herald* editor Arnold Kemo. The aim of the Glasgow indexing project was to fill a gap from 1969–1984 in the indexes to this renown daily newspaper. The existing indexes cover the years 1906–1968. The need for in-house indexing rests on the requirements of individual libraries and is arguably influenced by abilities of the professional staff and the capacity of the library to undertake the project.

The effectiveness of existing tools and the issue of how much an indexer becomes involved in the presentation of the finished product were discussed from a searcher's viewpoint of the Internet. Indexers were then reminded that sometimes the quality of the system on which one's work is based could affect both the presentation and the quality of information retrieved. Therefore indexers should be working closely with database providers to ensure that the requested depth of subject indexing is suitable (Missingham 1996:32). A number of combinatorial optimisation problems in information retrieval in which the use of local search methods are worthwhile, exist (MacFarlane & Tuson 2009:159). In-house indexing and local search can be used to solve these information retrieval problems. A query-based taxonomy can be used by the information retrieval practitioner to examine and develop the use of local search in information retrieval.

The need for descriptions from users was investigated to establish its effectiveness. As a technique for eliciting more robust information there is need for descriptions from users of information systems. Kelly & Fu (2007:30) proposed that such a technique could be used to elicit terms from users for use in query expansion and as a follow-up when ambiguous queries are initially posed. A feedback form was designed to obtain additional information from users, administered to users after initial querying and a series of experimental runs based on the information obtained from the form conducted. Results demonstrated that the form was successful as eliciting more information from users and that their additional information significantly improved retrieval performance. The results further demonstrated a strong relationship between query length and performance.

2.5.3 Factors necessary for success of an in-house indexing project

McAdams *et al* (1985) list the following as crucial factors which need to be considered for the success of an indexing project: appropriate skills, indexing rules, funding and computerisation. Libraries considering in-house indexing are advised to address these factors before the plunge.

2.5.3.1 Appropriate skill

One question which must be answered is, whether or not part-time staff with no indexing background and no particular aptitude for the topics covered can perform usefully and produce a worthwhile index. McAdams *et al* (1985), predict positive, affirmative response to the question. They conclude that “given training, enthusiasm, dedication, and time, this is possible. This view is however not completely acceptable to a number of authors in the field.

Lambert (1984:177) cites incidences where publishers insist that the author himself shall supply an index and describes this as a brutal and intolerable burden for the inexperienced author, and remarks: “When it is discovered that he has left out an important entry, he is convicted of incompetence. If he feels unequal to the task but still

has to fulfil his contract he is forced into humiliation and costly experience of employing a professional hack to do the job for him". Not only does this involve wild risks owing to the fact that professional indexers combine extreme technical ability with a complete indifference to the theme of the text, it also means that the author has received even less than the exiguous sum promised him by the publishers.

Lambert further remarks about the author that "he broods over this in the small hours and is thus not only of timidity but of avarice. Should he boldly shove the thing out minus index on the public, he is hauled over the coals by the highbrow weeklies."

Vickers (1992:23) maintains that the creation of the index involves more than tinkering with chaos. It calls for more than an application of basic skills. Indexers, according to Thomas (1984) face two unique and crucial problems requiring decisions to be taken without unduly prolonged debate:

- When is an indexer an indexer, an author, or a database constructor and how should the identification be made?
- When is an index an index and when is it a database, and is there a difference?

The Association of American Publishers established an electronic publishing project to set standards for use in tagging bibliographic elements and to allow for potential computer indexing when manuscripts were prepared on computers and transmitted to publishers other than as hard copy. Inadvertently, the American Society of Indexers was omitted from the list of interested parties for this project. It later became apparent that indexers were classed as authors. Thomas (1984:82) thus concludes that, "while the creation of an index does not result in a text nor abstract nevertheless the person creating an index is engaged in the occupation of writing, no more nor less, though the form is different. In doing so, the indexer is an author."

Another species that has emerged from the circuitry and silicon chips of the age of the computer is known as a database constructor. Many database constructors neither know that they are, or perhaps care to be identified with, authors or indexers. Nor do many of them know much of indexing! An index and a database are the same thing.

Data are information. It may come from any source and end up in any place. Clearly then to write an index is to create a database. We should therefore move our former positions as scribes, later cataloguers, later indexers, now authors, and on to database constructors (Thomas 1984:83).

Indexers have the special talent and training to write indexes and also have a responsibility to encourage future generations. They must continue to maintain high standards and to respond to evolutionary technological and linguistic changes, as the times demand. It is however, Ward (1996:217), who gives a detailed account of skills necessary for good indexing and cites the following requirements: considerable prior knowledge, judgment as to what to index and in what depth to index it, reading skills, including the ability to deal with non-verbal data, the analysis and evaluation of texts. The creation of abstracts, including the information of inter-textual links and classification skills are necessary for text base creation.

i Prior knowledge

To index effectively, there is need to:

- know the aims and policies of the institution and needs, both general and specific, of users;
- be familiar with the principles and terminology of the area in which you are indexing and its development over time;
- work with regard to the potential and limitations of the software, on which the indexing project is based (eg articles must not be more than 200 lines long);
- know the library's or agency's indexing policy (eg commerce and academic information must be highlighted and other less relevant aspects of literature sidelined, in a faculty of commerce library); and
- have enough general knowledge to cope with the problems of literature (eg of the activities of stock markets, the role of seasonality, from pricing to regional biases).

ii Judgment

While indexing periodical articles there is a need to make decisions about the articles and approach to them regarding their benefit, acceptability, exhaustivity, priority, security and responsibility. The indexer has to answer the questions: “is the article worth being allowed in the database?” (eg articles on the history of shareholders – such articles have to be rejected from the start due to their lack of relevance to stock issues of academic value).

When an article is accepted, it has to be judged whether it is complete, legible, of the required academic level and in a form which the library can handle. A decision has to be made on the following:

- The degree of exhaustivity to apply to each article.
- The priority of the document (eg documents covering aspects of identified urgent need for information have to be indexed at once).
- Consideration has to be made on security (eg should discussions of another company’s internal policies be in public domain?).
- Responsibility for the fate of documents after indexing (eg would X or Y be interested in this article? Should this article be directed to an awareness service for teaching staff?).

iii Reading skills

Reading involves the act of mentally incorporating the structure and content of a text not in and for itself, but as it is of value to the user of the text base. This is evidenced by the recognition that one feels when reading a text. According to Ward (1996), we read a text as if we are the end users of the text base. This means that before reading commences we have to have adopted something of the same stance, inclination and presumptions of our target audience. Such empathy can only be acquired through personal knowledge. Conversely, indexers also cover the multiple registered voices, aims and messages, both explicit and implicit of the author whose work they have to simultaneously tune into. In the course of a few minutes an indexer may have to switch from the formalism of an article announcing the results of a study, to a patent describing

in legally oriented language the design of a new computer part, to a brochure persuading his readers to buy the latest computer software package. Each of these reflects a strikingly different writing technique, even different typographical connections, which require a different reading strategy, a strategy loaded towards the retrievable data in each, which will satisfy a need of his users.

A text is not an object but a process unfolding in time. For a normal reader this is no problem since the dimension of time in which he/she reads is exactly the same as that of the document. But, since as indexers we operate on the tightest possible time scale, we have to deconstruct the time-bound nature of the text to fit our requirements. Ward (1996) recommends scanning or skimming, paying attention to the landmark features such as title, contents page, abstract, heading, the opening and closing sentences of each paragraph, conclusions, names, numbers, key self-reflective phrases such as “the purpose of this paper…”, highlighting phrases such as “the crucial feature of this computer program is…”, deal with translations and non-verbal features, require more special attention as reading techniques for indexers. Translation may be literally required of the indexer when a text is in a foreign language, adding the pressures of a different vocabulary, grammar and culture to the normal pressures of the author’s image and the users’ requirements.

Much of the meaning of certain texts is lost if non-verbal features such as performance curves, graphs, maps, tables, figures, drawings and photographs are excluded. In graphs, colour may be a critical feature, the identity of a car engine for instance may turn on the interpretation of a photograph and performance curves may be the only source of data on the engine’s power and torque.

vi Analysis and evaluation of the text

Analysis of the text is separated from the act of reading only by logic. The work of analysis according to Ward (1996) has two main components, each involving an act of comparison:

- The comparison of each text with all the other texts that have preceded it in order to identify the novel features which make it worth indexing. This involves the work of memory stretching over many years and many thousands of texts.
- The even broader one, comparing each text with the whole of the indexer's personal experience.

Common sense is essential if the trivial, extraneous, enormous and absurd features of the text are to be avoided and the problematic and unusual ones are to be understood. The reader has to go back to a basic sense of language and logic. Sometimes a completely novel concept emerges from the literature. For new concepts, advice should be sought from experts in the field since some terms require a process of recognition and explanation.

The ability to reduce complex language to basic, simple terms is sometimes crucial to understanding and good indexing. Common sense is a neutral reference language by which the various registers and sub-languages of the texts can be evaluated. What is constant is the word of specific and retrievable meanings. The language here operates at three levels:

- Highly articulated urgent eg in a computational fluid dynamics, involving concepts remote from common sense and the "ordinary world".
- Key reference to the hardware involved. The difficult paper suddenly focuses on a very specific and commonplace piece of machinery, of interest to the alike, for instance, "It is this that the indexer fastens on."
- Comparison between the text and the user's known needs and expectations. Indexers are armed with a set of mental frames and filters derived from their knowledge, which enables them to process the text and siphon off the power train information it contains. "If a component is mentioned, data is expected on its material, manufacture, price, application, advantages, and limitations, just as a reader will expect a sentence to contain a subject, a verb and an object. Thus, language is the pragma."

The following problems have to be addressed during the process of analysis: latency, synonymous information, redundancy, noise, genre, style and formats. Latency, for instance, is one of the besetting problems of analysis. An article may be really about something quite different from its nominal subjects. One text was nominally about the whole of mechanical engineering, but its latent meaning concerned the take over of one company by another. Edward de Bono (1995) has said about writing that, the writer usually has a story line or message. Very often the most important information has nothing to do with the story line or message. If you just follow the story line then you miss the other information. It is true that you cannot see the other information unless you already have some frameworks or ideas which give significance to the information. But if you have been thinking about the subject at all then you should have a mind rich in such frameworks.

Many descriptors are full of detail but do not mention some vital principle which is implicit in them. An otherwise unidentified engine which has a high compression ratio and a low-rated speed is likely to be a diesel. This synonymous information has to be captured during the indexing process. The analysis of a text to determine redundancy may result in much or even most of it being rejected for indexing purposes. Obvious excursions and repetitions some of which result from the nature of writing itself and the need to communicate a point of view, are at odds with the deconstructing task of the indexer. Some texts contain material which is not merely redundant but positively conceals information. The writers are prone to literary fireworks to embellish their otherwise repetitions task. Such has to be removed as it amounts to noise.

There are vast varieties of genres and styles, and texts in periodical literature. Typographic and physical formats also vary. The search for information and the criteria by which it is chosen are, however, constant. Indexing then becomes a process of unmasking countless disguises. It is impossible to index effectively without making a judgment about the text. Good texts will be treated differently from poor texts. Good texts are information-rich, or outstanding studies in their subject. Poor texts are low in information value, however, “good” even from the point of view of another database. All

texts are evaluated in order to determine the degree of exhaustivity to be employed in indexing. Otherwise the database will be full of rubbish and time will be wasted.

Even though more has to be rejected in indexing than accepted, it is important to ensure that what is rejected does not, after all, contain some vital piece of information, which too a routine approach to indexing would hide. One of the indexer's tasks is to be on the lookout for such wandering data. It may be that a reference to a valuable process is hidden in the very large page of a tedious report. Even though one must reject, it is never quite safe to ignore.

v Composing an abstract and articles inter-textual links

The indexer has to make a disciplined response which will fulfil two main purposes:

- it must convey the sense of the article in such a way as to enable the article user to evaluate it in order to decide whether or not to acquire it, and
- it must contain clues which will enable the article to be retrieved in any way possible which will assist a future search of the article.

The first part of a typical abstract will reflect the argument of the article and the insights it has engendered, what the article "says", both explicitly and implicitly. It is a direct communication between the indexer and the reader, "straight talk" in the reference language of common sense, which is the yardstick for judging the language of the article. The second part of the abstract may then be an array of key terms – information freed from syntax – which stand out in the article as a whole, a necessary substitute for the full article.

An important task for the indexer is to make cross references between parts of documents, or with discussions or letters related to them. Indexers divide concepts into classes and deal with them accordingly. Textual analysis is required for indexing. Thus indexers study the individual texts and for each, assess the element for the degree of importance it holds (Beghtol 1986). The library needs to do a skills audit and ensure that there exists adequate skills potential, if not to build or rely on contracted paid indexers for quality in-house indexing.

2.5.3.2 Indexing rules

Given the complex indexing situations which occur in periodical literature, rules have to be deliberately written to get one started. The rules attempt to set down practical, straight forward and as far as possible simple procedures for the indexers to follow. Guidance by example and the recurring principles is most appreciated by a team lacking indexing experience.

In addition to the rules, each indexer should have a copy of the used subject headings. Most of the established headings are retained to provide continuity. The list is the indexer's authority to assign a subject heading or headings to an item. The *Anglo-American cataloguing rules* (AACR2) have been adopted as the general authority for the formulation of persons, geographical names and corporate names when such headings are required for subject heading by the *Glasgow Herald* indexing project. The indexer working on the project has available on a flash the name authority file developed based on AACR2 which he consults to settle most problems.

Periodical articles require a varied number of search terms. Basic rules have to be drawn up by the library for each periodical title, on the maximum number of access points. For the *Glasgow Herald*, a basic rule of the index is: "a maximum of three access points may be provided for each item indexed." This rule of three is of course a rule of thumb and is widespread in newspaper indexing practice. Most items, hopefully, require less than three, one being the optimum in terms of economy of space and speed of indexing.

The question of what should be included in a periodical index often requires guidelines. Wellisch (1991:353) has advised that all local news and events be indexed for a newspaper, all local items including the following: all persons associated with the county, artistic and cultural activities, first and last events, local and state, politics, court cases, business news, disasters (natural and accidental), local sporting events, crime, social trends such as the rise and fall of population changes in the ethnic composition of

the city or country, and local product advertisements, vital statistics and editorials which pertain to the country should also be included in the index.

2.5.3.3 Funding

The impact of lack of sufficient funding on an indexing project was best summarised by Richardson (1988:85), when he made the following comments, based on their experience with the *Builder Journal:*

- Sadly, funding was simply not available for the index the *Builder Journal* merited.
- As funding was short, a decision was made to tackle discrete swatches of the builder's contents, rather than attempt a comprehensive index to only one or two years' issues.
- Due to lack of funding, a very small capacity computer – a BBC, with a working memory of 3 500 words was used. Nevertheless, whatever its shortcomings, the machine proved infinitely more swift and practical than cards.

A number of libraries have been unable to start indexing their periodicals due to lack of funds. Where a start has been made, lack of adequate financial resources has been the most irksome feature of such projects. This basic problem has meant:

- adoption of strategies in haste;
- make-do with inadequate technology; and above all
- hurry through the work.

2.5.3.4 Computerisation of the indexing project

Since librarians want to make the information available in both print and electronically, it is important to index with the help of computers. Kilcullen (1997:195) cites the *Canton Repository* where the plan for the repository was to provide the information in print or electronically but, ideally, the librarians wanted the index available over the Internet. It had been realised that with the right technology, the database could be offered as an Internet FTP (File Transfer Protocol) file (Gilster 1993).

Soon, innovations and technical breakthroughs in the World Wide Web and Microsoft Windows software began to affect this thinking. Rather than offer the index as a FTP file, why not publish on the World Wide Web? The popularity of the Internet continues to steadily increase, particularly because of technological advances in the World Wide Web (Walsh 1996). Publishing indexes on the World Wide Web is a simple and successful endeavour with the use of Microsoft Access. This is because Access creates a Web page for each page of report. One can then keep the table format, supported by both Netscape Gold and Microsoft Internet Explorer. The table formats also line up the records so that they can be viewed easily on the Web. Publishing the index on the Web has been made easier by using wizard dialog boxes (Kilcullen 1997:196). According to Le May (1996), if well developed, the index should offer a search facility for the campus and beyond. It should for instance be available on a Web server, support CGI (Common Gateway Interface) or Perl (Programming language) scripts (the normal programming that features search capabilities).

Several factors need to be evaluated when considering an in-house computerized indexing programme. These, according to Semounche (1986) include: ease of use from the aspects of data entry and database and use, computer programme flexibility, printing capabilities and versatility, search features, product support, hardware requirements and cost and suitability to this project. Concern should not only be with the ease of use but also how the final index would reach the users (i.e. distribution of diskettes, direct online access, etc).

Semounche (1986:25) gives the following requirements for an acceptable computer-indexing programme:

- The programme should be owned by the institution and allow for enough site licenses for the interested campuses to use it ie be accessible.
- There should be computer support and in-house workshops on the use of the programme and the database ie have support.
- The programme should provide a number of ways to organise data including database files including sorting and indexing ie be versatile.

- Once the database is set up, data entry procedures should be simplified for easy understanding by staff ie easy to use.
- The computer software should provide features for construction of a subject authority thesaurus online ie construction of a thesaurus.
- The programme should have report-generating capabilities. The reports should be generated as follows: subject bibliographies, author bibliographies and title bibliographies.
- There should be some members of staff who will develop an in-depth understanding of the software and the database being created ie familiarity.
- It should be desirable for other libraries in the area to be users of the same software ie other libraries.

An in-house computerised indexing project can be started with a minimum of one microcomputer. Knee (1988:31) cites the indexing of the *Albany Times Union*, a project which was started in June 1983 by the libraries of the state University of New York at Albany, thus: soon after acquiring an Osborne Executive 1 microcomputer through grant funds, they got started. A five-megabyte storage capacity for the data and programmes as long as no more than twelve months of the newsletter index was stored on it at any one time. Generally, the microcomputer system performed satisfactorily in the newspaper-indexing project. University libraries with at least one computer should, according to the evidence existing in the literature, be able to start a computerised indexing project.

2.6 SUMMARY OF THE LITERATURE REVIEW

The literature reviewed in this section has revealed that there were no indexes to periodicals before the 17th century. At the time, scholarship was a gentlemanly, leisurely activity. Also, the paucity of periodical publications and the few numbers that existed at the time contributed to this, as opposed to book indexes whose publication started in the 14th century.

Literature also suggests that the need for retrieving specific items on specific subjects in the shortest possible time might not have been an objective of the early indexers. The periodical indexes provided no adequate subject access, only presenting tables of contents of indexed periodicals and requiring one to scan through the entire index from beginning to end. This was a time-consuming and inefficient process. The work was done manually by indexers.

More recent literature indicates that tremendous developments in the theory and practice of periodical indexing have taken place. The most notable shift being the one from one volume printed indexes and cumulative volumes to database indexing whereby the indexing is being performed by teams of indexers. Databases provide indexers with automated aids that perform clerical tasks while indexers perform their intellectual tasks and the time-lag between the appearance of a periodical issue and the publication of its index has been reduced to a matter of a few weeks at most.

There exists evidence in the literature to suggest that some databases offer neither indexing performed by human beings nor automatic indexing. Instead, they rely on the words of full text and on search strategies to extract desired words, phrases or clauses and shift the bulk of indexing to the users who must use proper retrieval strategies to get the relevant articles. When employed, these automatic summarisers have the advantage of reading the whole text virtually instantly and are therefore fast and more consistent than the human indexer, unbiased and capable of considering more than a single text. The literature however indicates that machine indexing can only index terms expressed but not implied, as is the case with human indexers.

Leading authors on the subject of indexing have maintained that good indexing requires considerable knowledge of the literature, judgement as to what depth to index it, and reading skills, including the ability to deal with non-verbal data and the analysis and evaluation of texts. Computers can only adjudge the presence/absence of words and can therefore not differentiate what is merely referred to from what is said (“comment” from “topic”). Another development revealed in the literature is the increasing number of

indexing agencies that are showing interest in automatic indexing rather than in improving machine-aided indexing. Essentially, the analysis phase is lamented as an intellectual operation resistant to investigation. This lack of focus on the cognitive processes and clear vision in determining “aboutness” has continued to hound the indexing profession and renders some of the existing databases ill constructed to adequately meet varying needs of researchers.

The section on indexing theory has covered indexing characteristics which affect retrieval. Some of these include: overall approach, exhaustivity, specificity, correctness, consistency and indexing policy. These continue to pose the question as to whether the present indexers are adequately meeting the varied needs of researchers given the disparities in coverage, indexer competences, editorial policies and priorities of indexing agencies. Thus both high and low quality indexes are in existence.

The place of human indexers for periodicals covered in databases seems secure while more and more of their intellectual abilities are put to good use by relieving them of tedious and repetitive tasks that are then performed better and quicker by machines.

The need for libraries to index for their users has come out clearly as one of the major reasons for in-house indexing projects established in university libraries cited in the section on in-house indexing. When done in-house, the indexers tend to be fully briefed on the user needs and make adequate provisions for these, covering areas of core value to their researchers. This position has been investigated in university libraries in Kenya and discussed in the light of the developments that have occurred in the theory and practice of periodical indexing elsewhere in the literature and will be reported in subsequent chapters.

Since the ultimate aim of this study was to assist university libraries in Kenya to improve on the identification, access and usage of periodicals held in their collections, recommendations that could be adopted by the libraries to achieve these have been given in Chapter 6.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 INTRODUCTION

This chapter covers the research methodology used in the study. The chapter details the research design, the methods used for collecting data, methods of data analysis and the problems encountered during the study.

3.2 RESEARCH DESIGN

Different authors have classified research methods in different ways. For example, Gray *et al* (2006:10) have classified research methods by analysis and purpose. Anderson (1998:88) classifies research methods mainly by the method of data collection. However, these broad classifications, according to Mugenda and Mugenda (1999:155) are not necessarily mutually exclusive and a researcher could use more than one.

The study adopted a research methodology based on methods of data collection that was essentially descriptive research. Descriptive research is defined as a process of collecting data in order to test hypotheses or answer questions concerning the current status of the subjects in the study (Gray *et al* 2006:11). This definition was adopted and used to answer questions concerning the various aspects of indexing and access to periodical literature in university libraries in Kenya.

The purpose of descriptive research, according to Mugenda and Mugenda (1999:160), is to determine the actual position. This type of research attempts to describe such aspects of research as possible behaviours, attitudes, values and characteristics and therefore fitted the objectives of the present study. Mugenda and Mugenda (1999:161) give five broad steps that can be used in the process of conducting descriptive research, namely:

- formulation of objectives of the study
- designing the methods of data collection

- selection of the sample
- data collection
- analysis of the results

This study followed the above steps and aimed at getting an “overall feel” of the position with regard to access to periodical literature in university libraries in Kenya. To do this, the researcher engaged in a holistic observation beginning June 1998 at the University of Nairobi Library. This provided a valuable ground scene-setting device, which was a prelude to more focused observation. The emerging issues, which appeared to have particular significance or interest, helped in shifting observations from a broad canvas of activities in the setting towards specific areas. Aspects that emerged as worthy noting and investigating were put together and used in the preparation of the research proposal, setting of study objectives, designing the questionnaires used in the study to cover all university libraries in Kenya and discussing the results.

The study was conducted between August 1999 and September 2001 in university libraries in Kenya.

The current study employed a survey research method. A survey is defined as a method used to collect data from members of a population in order to determine the status of that population with respect to one or more variables (Mugenda & Mugenda 2003:164). A survey seeks to obtain information that describes existing phenomena by asking individuals about their perceptions, attitudes, behaviours or values and enables the researcher to capture as many types of behaviour as possible that may be of interest to a study which cannot be arranged in a realistic setting. As this was social and behavioural research, a survey was considered appropriate since many types of behaviour of interest to the study could not be arranged in a realistic setting.

Surveys are concerned with describing, recording, analysing, and interpreting conditions that exist or existed and relationships that exist, opinions that are held and processes that are developing (Kothari 2004:120). The researcher does not manipulate variables

or arrange for events to happen. By using surveys, it is therefore possible to measure characteristics of a large population. The survey method enabled the researcher to collect original data from university libraries in Kenya spread across the country. The research design was rigid and made enough provision for protection against bias, maximised reliability and aimed at obtaining complete and accurate information. This was achieved by using sample surveys that employed mixed data collection methods (see section 3.4 Data collection methods). The method was therefore considered suitable for the study and enabled the researcher to cover a large number of cases.

3.3 IDENTIFICATION OF POPULATION AND SAMPLING PROCEDURES

This section covers target population and sampling procedures used in the study.

3.3.1 Target population

The target population of this study consisted of librarians working directly with periodicals (periodical librarians) in their university libraries and library patrons, including students who were writing their research projects at the time this research was being carried out. These were used as key respondents. The study anticipated that librarians working with periodicals in university libraries in Kenya would be in a better position to give information on indexing, access and usage of periodicals in their libraries.

The subjects used in the study to gather user information were fourth year commerce undergraduate students. Fourth year commerce students in universities in Kenya are required to write a research project. They are expected to conduct research and contribute to existing literature as a requirement for their study. Commerce is among the courses offered by most universities in Kenya. The course was therefore considered important to the study for uniformity and applicability given the variations in purposes, stress and research expectations in the teaching faculties in universities.

The Faculty of Commerce library of the University of Nairobi where the researcher worked as a librarian was considered to be a suitable site. It offered the researcher an opportunity of observing users as they used periodical literature in a more focused way.

All fourth year students who visited the Faculty of Commerce library during the study period were used as subjects for observations to obtain data relating to user access to periodical literature. The study expected these patrons to be a representative sample suitable for providing in-depth data relating to the usage of periodicals. The variations in their research topics were crucial for meeting the objectives of this study and for answering related research questions of the study, particularly on the level of indexing.

3.3.2 Sampling procedures

In order to obtain an in-depth study and to acquire a demonstrable degree of reliability and validity within the identified population sample, the researcher used the following sampling procedure:

a Sampling procedures for librarians

- All 20 universities listed in the Kenya Education Directory (2000) were included. This included both private and public universities.
- Branch libraries that held at least 500 volumes of periodicals were selected. Eleven branch libraries from all universities in Kenya met the criteria and were included in the study as independent entities, bringing the total number of university libraries covered to 31.
- Thirty-one librarians from all university libraries in Kenya working directly with periodicals in these libraries were used as respondents in the survey.

b Sampling procedures for library patrons

- Three hundred and sixty fourth-year students from universities in Kenya working on their final year research project were used in the study as respondents to gather information relating to user access to periodical literature using a questionnaire. These included 240 students from the University of Nairobi and 120 students from other universities in Kenya who were users of the Faculty of Commerce Library of the University of Nairobi. The names of the University of Nairobi students were

obtained from the Faculty of Commerce's nominal roll, while the details of students from other universities were obtained from the file containing letters of introduction maintained by the Faculty of Commerce Library. Users from other libraries are required to come with letters of introduction from their institutions stating the reason for requesting to use library facilities – their student identity cards will give them access to the University of Nairobi libraries. All students entering the library are required to surrender their library cards at the library entrance. Each identity card has the name of the student, number, photograph, university, faculty, course, year of completion and the student's signature.

- A total of 118 fourth-year commerce students, who approached the researcher during the study period for literature searches, were used for participant observations. A participant observation schedule covering user information on aspects sought by the study was used as a checklist during the participant observations (see Appendix 5). Each participant was observed from the time the researcher was approached for information to the time the information was given to the user/participant.
- A document analysis was conducted covering indexes used to identify information requested by the library users observed during the study. A checklist covering attributes considered necessary for evaluation of the indexes consulted during the study was used to evaluate the indexes (see Appendix 6). The document analysis included all indexes used to identify the information required by the 118 library users that were observed during the study.
- A total of 27 librarians from the 27 university libraries in Kenya who had responded to the questionnaires, were interviewed. The interviews were face-to-face with 21 librarians who worked within Nairobi as well as those who worked around Nairobi. Six librarians working in university libraries located beyond Nairobi were telephonically interviewed. The face-to-face interviews took an average of thirty minutes while the telephonic interviews took ten to fifteen minutes.

3.4 DATA COLLECTION METHODS AND PROCEDURES

The main methods of data collection included two sets of semi-structured questionnaires, one for periodical librarians, marked as “A” for identification purposes and the second for library users, marked as “B”. Participant observation, an interview schedule, document analysis (ie examination of existing indexes) as well as a literature review were also used for data collection.

3.4.1 The questionnaires

A questionnaire was deemed as a suitable data collection instrument because as Denscombe (1999:105) argues:

- the use of a mail questionnaire for similar studies is a well-established and accepted practice; and
- information for a relatively large sample is inexpensively collected through the use of mail questionnaire.

The widespread geographical distribution of university libraries hindered direct survey methods for some of the targeted libraries such as, Moi University Library located 400 km away from Nairobi; Kisii University College library located 350 km; and Maseno University College which is 400 km away from Nairobi, among others.

Using the questionnaire to collect data however has the following limitations:

- the control over questionnaires may be lost once they are sent;
- there is inbuilt inflexibility because of the difficulty of amending the approach once questionnaires have been dispatched;
- some answers given are either incomplete or poorly completed;
- in some cases, the respondents are not able to express their views in detail due to the limit, shape and nature of the questionnaires;
- the researcher cannot counter-check on the truth of the answers given by respondents due to distance, trust and the fact that the researcher has no solid ground to challenge the respondents (Kothari 2004:101).

The questionnaires consisted of both open- and closed-ended questions. The closed-ended questions required respondents to answer “yes” or “no”; other questions required respondents to choose from alternatives given; and yet other questions required brief comments. The Likert scale, consisting of statements that express either a favourable or an unfavourable attitude and attitudinal favourableness was used. Each response was given a numerical value to reflect the degree of favourableness towards the object. Likert scales are easy and quick to construct, reliable and provide greater volume of data (Cooper & Schindler 2006:339).

For open-ended questions respondents were given an opportunity to give their opinions. This had the advantage of ensuring that the information reflected the richness and complexity of the views held by the respondents about a particular aspect.

i Questionnaires for librarians

A total of 31(100%) questionnaires marked as “A” (see Appendix 2), were mailed to periodical librarians by post. Out of these, 27 were received back.

This questionnaire included questions on holdings and access to periodical literature, provision of indexes and databases and feasibility for in-house indexing. The questionnaire sought answers on the need for indexing of available access tools, evidence of indexing or lack of it, factors hampering development of in-house indexing and the willingness of university libraries to index their periodicals either individually or jointly.

ii Questionnaires for library patrons

A total of 360 (100%) questionnaires marked “B” were dispatched to library patrons in their fourth year of study. Out of these, 316 were received. This questionnaire consisted of questions on availability and usage of periodicals, methods of access and identification of periodical articles and the expressed need for a locating tool.

The questionnaire sought to determine the state of the art regarding access to periodical literature, methods used by library users to access and to identify periodical articles, determining usage patterns and exploring the need for in-house indexing from the users' point-of-view.

3.4.2 Participant observation

The participant observation method was also used to collect data. This was prompted by the need of the researcher to gather information which could not be easily obtained through questionnaires or interviews. By way of direct observation without asking the respondent and by observing in a disinterested fashion, the researcher was able to observe and record what was happening. The subjective bias was eliminated and the information obtained under this method related to what was happening at the time. The method was considered to be independent of respondents' willingness to respond and as such relatively less demanding of active co-operation on the part of the respondents as happens to be the case in the interview or questionnaire method**.**

Participant observation has been defined as a data collection method where the observer observes by making himself, more or less, a member of the group he is observing so that he can experience what the members of the group experience (Kothari 2004:96). The study required that the researcher collects the data as an insider and observes users as they used periodicals in a more focused way.

Participant observation has been described as being very valuable among other survey methods. A classic definition of participant observation spells out the crucial characteristics of this approach which made it suitable for this study. Participant observation is defined as:

> … the method which the observer participates in the daily life of the people under study, either openly in the role of researcher or covertly in some disguised role, observing events that happen, listening to what is said, and questioning people, over some length of time (Fraenkel & Wallen 2006:450).

Participant observation is a period of intense social interaction between researchers and subjects in the milieu of the latter, during which time, data in the form of field notes, are

unobtrusively and systematically collected (Maykut 1994:22). The observation is used to generate theory rather than to test it. The object is to describe the complexities found in the situation with a minimum of prior theorising. Consequently, one of the most notable aspects of participant observation is the absence of standardised operating procedures (William & Brewer 2001:22).

The researcher, a periodicals librarian at the University of Nairobi Library and later librarian at the Faculty of Commerce library, was therefore “there” and “in the middle of the action”. As a participant observer the researcher was able to operate in a completely covert fashion like an undercover agent whose success depends on remaining undetected, and whose purpose remains top secret. If no one knows about the research except the researcher, the logic is that no one will act in anything but a normal way. “Preserving the naturalness of the setting” as advocated by Denscombe (1999:148), is the key priority for participant observation. The principal concern was to minimise the disruption so as to be able to see events as they normally occur – unaffected by any awareness that research is taking place. Another priority was to gain information about events which would have remained hidden from the view of the researcher were he to have adopted other methods.

The participant observation technique was used in gathering data without involving the respondent at Lower Kabete Faculty of Commerce Library by the researcher while serving library users as their librarian. The insider experience put the researcher in a particularly strong position to gather information and deal with the meaning of actions from the participant’s point of view. The observations involved the following: looking and assisting library users as they used periodicals and assisting them to obtain periodical articles and noting certain phenomena or items; listening and recording comments made by users of periodicals at the time of use; and determining actual satisfaction through met needs and expressions by the users of periodicals.

Following the observations, the researcher was able to identify specific trends which concentrated on aspects of periodical usage that appeared to be unexpected or

contradictory. Attention was focused upon things that, according to the observer's professional knowledge, ought not to happen. Through the observation method, the researcher also tried to identify issues and problems which participants themselves regarded as crucial. The point was to observe instances which indicated how the library users use periodicals, listen to their views, note their experiences and expressed satisfaction after use, and to also see if the available indexes were adequately facilitating access to the information sought by university researchers.

The role of the researcher as the information provider was known to the users, but the aim of the researcher remained hidden from them. The researcher assumed the role of someone who was discharging his normal duties in the normal setting. The field notes included actual quotes, clear distinctions between "fact" and "impressions", incorporation of unusual and inexplicable events, explicit rendering and bracketing of feelings and launches, and comments on benefits as well as details on actual topics for which information was sought.

By observing the usage of periodicals from the insider's point-of-view, the researcher became aware of crucial factors relating to access, identification and usage of periodicals. The nature of participant observation also allowed the researcher to place greater emphasis on depth rather than breadth. The participant observation produced data which were better compared to other methods to reflect detail, complexity and the interconnectedness of issues relating to the study.

The observations were conducted using a designed schedule as a checklist. The checklist included questions and phenomena to be noted for every category of library user seeking assistance for the research project and addressed issues arising from research requirements. These included for instance, expressed satisfaction, whether the service was slow, need for indexing exhaustively and combining of concepts, whether the tools used to locate information from periodicals was up-to-date and suitable, the utility of information and the ability to supply cited references. The notes

taken during the observations were recorded on users' request sheets and filed, then analysed on completion of the transaction.

Out of 360 library users selected for the current study, a total of 118 (32.8%) participated in the observation. These were students who visited the library during the study period. These patrons had already filled out and returned questionnaire "B". The researcher collected the desired data without the subjects knowing his own aim being research while working as librarian.

The participant observation, however, posed some limitations. For instance, the researcher had to depend on his own interpretation of observed patterns. Also, the researcher conducted the study keeping his true identity as a researcher conducting a study and purpose of the study from the library patrons as this might have influenced some of the responses, as the users might have responded differently had they known research was being conducted.

Despite these limitations, the participant observation method provided useful information which complemented data that was collected using other methods.

3.4.3 Document analysis

Document analysis was also applied as one of the data collection methods. The method involved examining published indexes used to identify information contained in periodicals held at Lower Kabete Library where the observations were conducted. The evaluation centred on indexing exhaustivity, specificity, consistency, up-to-dateness, indexing policies and overall retrieval performance. A checklist covering these attributes was used to conduct the analysis. Aspects of the above attributes considered necessary for evaluating the indexes were identified and included in the checklist. The evaluation of the indexes was conducted while the 118 library users observed during the analysis, received assistance in identifying articles from the indexes. The following indexes were consulted and evaluated: *Ngarua Periodicals Index; The Weekly Review Index*; *The Accountants' Index*; *Social Science Citation Index*; and *British Humanities Index.*

Retrieval performance of the indexes was also compared with an in-house periodical index at Lower Kabete Library. The document analysis method was used to capture information on issues including those that were unobservable during the participant observations. The data presented in the document analysis was used alongside that captured using observations' checklist and discussed in Chapter 5.

3.4.4 Interviews

According to Mugenda and Mugenda (1999: 83) an interview is: "an oral administration of a questionnaire or an interview schedule and is therefore a face-to-face encounter." Interviews can also be conducted electronically. The decision to use interviews was based on the following advantages cited by Mugenda and Mugenda (1999:83–84):

- Interviews provide in-depth data which is not possible to get using a questionnaire.
- Interviews make it possible to obtain data required to meet specific objectives.
- Interviews guard against confusing questions since the interviewer can clarify the questions thereby helping the respondent give relevant responses.
- Interviews are more flexible than questionnaires because the interviewer can adapt to the situation and get as much information as possible.
- Interviews are very sensitive and personal information and can be extracted from the respondent by honest and personal interaction between the respondent and the interviewer.
- The interviewer can clarify and elaborate the purpose of the research and effectively convince respondents about the importance of the research. Respondents can then give more complete and honest information.
- Many respondents do not like exposing their negative side. With interviews the interviewer is able to get such information through interaction and genuine conversation.
- Interviews yield higher response rates mainly because it is difficult for a subject to completely refuse to answer questions or to ignore the interviewer.

Interviewing as a method however, poses the following limitations (Kothari 2004:99):

- It is a very expensive method, especially when large and widely spread geographical samples are taken.
- There remains the possibility of the bias of interviewers as well as that of the respondent; there also remains the headache of supervision and control of interviewers.
- The method is relatively more time-consuming especially when the sample is large and recalls upon the respondents are necessary.
- It is not possible to interview many subjects in a wide geographical area within a limited time as would be covered using a questionnaire.
- It is not possible to establish whether the identity of the researcher might have affected the interview statements.
- The data collected from the interviews is based on what informants say they prefer and what they think cannot automatically be assumed to be the truth.

The above limitations did not have much effect on the study since interviews were conducted as a follow-up and served to supplement the methods mentioned above. The interviews were held to clarify issues arising from questionnaire responses and participant observations. A variety of questions and phenomena to be noted for every category of library user, librarian and issues arising from questionnaires and participant observations, were prepared based on the responses and observations made. These included for example, expressed satisfaction, exhaustivity of indexing and whether in-house indexing was considered necessary or not. Specific questions varied from one respondent to another depending on issues that required clarification. Some of the issues which needed to be clarified using participant observation method were: the need and possibility of combining concepts during a search; sufficient deadlines and the meeting of deadlines; the speed taken to provide references; utility of articles given to patrons requesting information; convenience and suitability tools/methods used to identify articles; expressed and observed overall satisfaction of users with the service provided to them.

Since the interview method was used alongside other methods as a follow-up to clarify issues identified in the study using other methods, the limitations of this method were considered too minimal to have an impact on the overall results of the study.

3.4.5 Review of the literature

As stipulated in Chapter 1 and provided in Chapter 2, a thorough review of the literature pertinent to the study was undertaken as one of the approaches that informed the current study. The review covered information on the following topics:

- Principles of indexing.
- Development of periodical indexing.
- The indexing practice and usage of periodical literature by university researchers.
- In-house indexing.

This put the researcher in a better position to address the research questions and link these to information on the state-of-the art in university libraries in Kenya as revealed through questionnaires, participant observations and interviews as well as existing evidence in the literature.

The method was used to fulfil /answer the following research questions:

- How does the indexing or lack of it influence the usage of periodicals in university libraries in Kenya?
- Are there any notable developments that have occurred in the practice of periodical indexing in university libraries in Kenya?
- What effect can indexing have on retrieval performance? Is the quality of indexes in university libraries in Kenya effective in retrieving relevant information contained in periodicals held by the libraries?
- Why is the concept of aboutness so central to the indexing process? How is aboutness determined by university libraries in Kenya?

The literature review was considered an appropriate approach as it enabled the researcher to adequately discuss research questions by making reference to developments in theory and practice of periodical indexing as witnessed in university libraries in other parts of the world and applying these to the Kenyan situation. Pertinent literature was also used in the analysis, interpretation and discussion of the results to cover aspects considered important to the study. Although some of the references may appear dated, they constitute principles and procedures in indexing which do not change.

3.5 PILOT STUDY

The effectiveness of the questionnaires was tested using five students and five librarians while the interview questions were tested using five students and five librarians. The instruments were found to be suitable for the current study. This ensured that the questionnaires were of the right level and that the expected answers would be found.

3.6 DATA ANALYSIS AND INTERPRETATION

The analysis and interpretation of data were conducted, bearing in mind the objectives and research questions already established for the study. The data was in the form of responses from questionnaires, notes from interviews, and those collected during observations, and published information as well as the documented study.

3.6.1 Analysis of data

Data was coded and entered into the computer using electronic spreadsheets. Responses to closed-ended questions were analysed using the Statistical Package for the Social Sciences (SPSS). Data from both questionnaires (i.e. open- and closed-ended) were tabulated to facilitate analysis. Each variable was assigned a unique numerical code by which it could be identified in the data file. The computer analysis technique enabled the grouping of the data according to various measures of central tendency, giving statistics for various variables, which were then calculated and the data

tabulated to reflect frequencies and percentages. These were used to discuss the results. The responses from open-ended questions in the questionnaires, observations were recorded separately and used during the analysis of data and interpretation of the overall data.

3.6.2 Interpretation of data

Relationships were compared and interpretations made using data obtained through the methods employed in the study. The purpose of interpretation of the data was, as stated by Kidder (1991:314) “to search for the broader meaning of answers to research questions by linking them to other available knowledge.” Where necessary, similar information was brought together and comparisons made for example, when establishing the views of library users about the usefulness of periodicals and how they benefited them in their academic programmes. Comparisons were also made of those users who used indexing tools with those who did not and between those users who were assisted by librarians and those who did not receive any assistance. This was linked to reasons for non-use of indexes cited in the literature. This enabled the researcher to establish whether there was a need for the development of indexing tools for purposes of accessing the periodical literature.

The results obtained were expected to reveal the existence of the need for indexing and the factors that hindered the development of indexing in each university library. These paved the way for viable and practical recommendations to be made in respect of the basis for developing in-house indexing to facilitate effective utilization of periodicals held in individual university libraries in Kenya.

3.7 ETHICAL CONSIDERATIONS

The concept of ethics can be traced back to Aristotle (Levine 2001:56). Presently, the International Centre for Information Ethics offers a forum for information as well as communication about ethical issues *(http://v.hbi-stuttgart.de/capurro/ice-index.html).* The Committee on Science, Engineering and Public Policy of the National Academy of Sciences, National Academy of Engineering, and the Institute of Medicine established in

1995 (Committee on Science 1995) addresses research as well as treatment of data, the whole values of scientific research, conflict of interest, and the importance of publication, proper citation practises, authorship, misconduct and discipline.

Ethics has been defined by Olive Mugenda as philosophy which deals with one's conduct and serves as a guide to one's behaviour (Mugenda & Mugenda 2003:190). Research ethics according to Abel Mugenda focuses on the research process and covers the application and ethical standards in the planning of the study, data collection and analysis and dissemination (Mugenda 2008:294). Ethical standards include those that enjoy virtues of honesty, comparison and empathy when dealing with subjects/respondents in research.

Research has to be carried out with cognisance of the state regulations governing the conduct of research with human participants (Sommer & Sommer 1986:17). It is therefore necessary for all social scientists to appraise themselves of the logical conditions and the actual and potential effects of data protection laws and privacy and analogous laws (Akeroyd 1991:89). Since the study was carried out in Kenya, it was necessary that the researcher abide by the Kenyan policy on research ethics. The researcher consulted the relevant chapter of the laws of Kenya to acquaint himself with the policy requirements before beginning the study *(*Republic of Kenya. *Science and Technology Act 1980*). The following factors are considered to determine if a research proposal to be carried out in Kenya is ethical by Kenyan law: value, scientific validity, fair subject selection, favourable risk ratio, independent review, informed consent and respect for potential and enrolled subjects (Republic of Kenya. National Council of Science & Technology 2004).

In some countries, statutes and regulations limit the period within which confidentiality can be maintained. In Kenya, the period of limitation is five years. Data cannot be destroyed until five years have lapsed from the time it was collected (Mugenda 2008: 301). The present researcher put in place mechanisms for making sure that the raw

data used in the study will be properly destroyed by burning and shredding at the expiry of five years.

The researcher visited the Internet to acquaint himself with the University of South Africa's policy on research ethics and identified issues that had to be dealt with (*http://www.unisa.edu.au/res/ethics/frameworksection1.asp*). The University of South Africa requires researchers to foster and maintain an environment of intellectual honesty and integrity, scholarly and scientific vigour. This requires researchers to:

- search for knowledge and understanding
- conduct research honestly
- respect the rights of those affected by their research
- manage conflicts of interest so that ambition and personal advantage do not compromise ethical or scholarly considerations
- adopt methods appropriate for achieving the aims of each research proposal
- follow proper practices for safety and security and comply with relevant legislation, standards and university policy
- cite awards, degrees conferred and research publications accurately, including the status of any publication, such as review or in press, when giving information about themselves or others
- promote the adoption of responsible research practice
- ensure, as far as practicable, that agreements with contractors that they engage to conduct research under the auspices of the University of South Africa include commitment to follow the general principles of the code or this framework or another code that is consistent with these
- report suspected research misconduct, in accordance with this framework and/or university polices
- conform to the policies adopted by their institutions and bodies funding the research, and
- disseminate research findings responsibly.

There are a number of ethical issues with regard to the research activity. These have to be addressed as they relate to participants, researchers and sponsoring organisations. The present study considered ethical issues discussed below, in line with the requirements of the research problem.

The decision to undertake research rests upon a considered judgment by the individual researcher about how best to contribute to the area/field and human welfare (Sommer & Sommer 1986:17). The present research was carried out with respect and concern for the dignity and welfare of students and librarians that participated in the study. As the researcher was already working in a university library in Kenya the research on "In-house_indexing of periodical literature" was carried out in-house as a way of improving the quality of service given to users of periodicals in university libraries in Kenya.

Researchers are people who are genuinely concerned with other people's quality of life. They must be people of integrity who will not undertake research purely for personal gains but will insist on obtaining information that will improve the quality of life of other people. In choosing the research topic, the researcher had a genuine concern for the access to information and failure to get information available in the library by university library users and sought to find a tool that could assist them to identify relevant information from the periodicals.

Research etiquette demands that the research methods be fully described before the start of field work and that research should stick to the proposed methods (Mugenda 2008:298). Research methods used in this study were evaluated fully before the process of the collection of data started and the study was carried out as stated in the data collection and analysis procedure.

It is unethical for a researcher to use a method or procedure knowing it is inappropriate. This may include selecting a highly biased sample, using invalid instruments or drawing wrong conclusions. In the present study, the researcher explored various research methods and settled for ones, considered most suitable. The researcher ensured that

questionnaires used in the study were pre-tested, the sample used was inclusive and as set out in the study methodology.

To use an appropriate methodology but to report the findings in a way that changes or slants them to serve own interest is unethical. The researcher in this study ensured that responses from all participants were accurately captured, discussed, interpreted and conclusions drawn. The researcher avoided bias i.e. the deliberate attempt to either hide what was found in the study, or highlight aspects of the study disproportionately to their true existence.

It is considered unethical to collect information without the knowledge of participants and their expressed willingness and informed consent (Kumar 2005:212). Informed consent implies that subjects are made adequately aware of the type of information the researcher wants from them, why the information is being sought and to what purpose it will be put, how they are expected to participate in the study and how it will directly or indirectly affect them. They must be fully informed about what it is they are consenting to (Jupp 2006:149). The participants in the research should have an opportunity to give or withdraw their consent. In order for them to give informed consent, participants have to be told something about the study (Peil 1995:18). They must be told the truth and be given facts about the research in order to make an informed decision whether or not they want to participate in the research. Informed consent should be based on information regarding: the purpose of the study; any foreseen risks; a guarantee of anonymity and confidentiality; identification of the researcher; and benefits and compensation or lack thereof (Mugenda & Mugenda 2003:1920). Respondents in the present study were informed about the purpose of the study and what was being investigated; they were assured that the answers would not be traced back to them as a sign of confidentiality. All the questionnaires had a signed accompanying letter which stated that the information would be treated with confidence. The questionnaires had the researcher's contact details that were used to return the filled-out questionnaires.

Participants must be competent to give consent, sufficient information must be provided to allow for reasoned decision and consent must be voluntary (Schinke & Gilchrist 1993:83). Respondents in this study were university students and librarians working in university libraries. These were competent and well-educated people who made an informed decision to participate in the study. Their participation was voluntary. Sufficient information was given on questionnaires and other data collection instruments which made it possible for the respondents to make reasoned decisions.

Unethical behaviour would occur if the researcher had failed to disclose the real purpose of the research, fearing the subject's refusal to participate (Mugenda & Mugenda 2003:1920). During participant observations, the participants were not aware that they were being observed by the researcher. The researcher had considered the need to have a disguised environment in order to obtain a normal picture of what the students went through during their search for information with a view of improving access to information. The researcher weighed the situation up and found it necessary to maintain the status quo to achieve the objective of the study. This was not done for fear of a person's refusal to participate and did not interfere with the behaviour of the subjects that were being observed. The observations were conducted in order to assess the information identification process. As a general principle, the right to knowledge must be balanced by the rights to personal and community integrity and privacy (Peil 1995:16). This places limits to where, when and how research can be carried out. In this study, the areas of concern included weighing up the cost and benefits of the study and obtaining the informed consent of those being observed in the study.

Researchers have a primary obligation to respect confidentiality of information obtained from persons in the course of their research. They reveal such information to others only with the consent of the person or the other persons' legal representative, except in those circumstance in which not to do so would result in clear danger to the other person or others (Sommer & Sommer 1986:16). Respondents should be protected by keeping the information given confidential, especially if confidentiality has been assured (Mugenda & Mugenda 2003:19). Lack of confidentiality and mishandling of information

provided may cause respondents harm. Releasing names of those who either answered as well as those who were not able to answer certain questions is unethical. Also, sharing information about a respondent with others for purposes other than research is unethical (Kumar 2005:214). Respondents in this study were assured of anonymity, whereby their names were not disclosed. The researcher used information provided but protected their identity and privacy. Individual codes were put on questionnaires. The researcher linked-up the code to the name in order to make the follow-up that was conducted during interviews, after analysing the questionnaires. The source was not disclosed. The respondents were referred to as students or librarians without disclosing the individual students/librarians or libraries where the questionnaire had been filled in. The only library that was disclosed was where a case study was conducted (ie Lower Kabate Library of the University of Nairobi).

It is considered by many experts unethical to purposely avoid a pertinent research issue for fear of repercussions or because of conflict of interest (Mugenda 2003:194). A researcher is expected to be honest in search of genuine research problems and should exercise academic freedom to discuss any findings. The present research addressed issues considered relevant to the identification and access to periodical literature and discussed findings before drawing conclusions, without avoiding any aspect. The researcher must be free to discuss and publish findings without fear of intimidation, being victimised or losing his or her job. The researcher was aware of his rights and academic freedom and on issues of intellectual property.

It is unethical to conceal research findings after completion of the research (Mugenda & Mugenda 2003:193). This may happen if the findings are contrary to the researcher's expectations, if they may bring protest, or if they are likely to affect certain policies negatively. The present study has a separate section on how the findings will be disseminated to ensure that information obtained through the study reaches the targeted beneficiaries (see 1.8).

There are situations where a researcher may refer to another person's work as theirs without acknowledging the author. Other researchers may fake data that has not actually been collected. All these amount to unethical behaviour. Such may be punished by laws that prohibit the unethical behaviour. In the present study, acknowledgement of the author's works referred to has been done by giving full citation of works referred to in the bibliography. The author has also made a signed declaration stating that the study "In-house indexing of periodicals" is his own work and that sources used have been acknowledged by means of complete references.

Reaction to a report may elicit unethical behaviour, particularly if the remarks are not favourable. For instance, an examiner may seize an item and dismiss the entire report even when 98% of the findings and recommendations are complementary (Sommer & Sommer 1986:18). The present researcher, having assisted research students working towards their Master's and PhD programmes at the University of Nairobi as their librarian, anticipated some of the reactions that the report was likely to elicit. Indeed, remarks made by the supervisors during supervision period and the examiners, served to assist rather than discourage and helped in improving the quality of the research.

Research into professional practice has ethical, political and practical problems. According to Sapsford (2007:41) it is difficult for a researcher to:

- separate himself from his professional presumptions
- carry out research to make what he was doing public which could lend some colleagues/patrons to feel spied upon
- conceal the research to cause less immediate harm/disruption.

The questionnaires were filled in by the library users and librarians while the observations were conducted by the researcher in his working environment and the professional colleagues were used as respondents for the interviews. The researcher had anticipated these and other problems that could lead to ethical conflict and avoided being compromised, given the role the findings were expected to play in improving access to information in university libraries.

3.8 PROBLEMS ENCOUNTERED

3.8.1 Student riots

Students were suspended at a time when the questionnaires were ready for dispatch. This delayed the data collection programme by more than two months. Some of the students were suspended for four years and could therefore not participate in the study although questionnaires had been dispatched to them. This affected the response rate.

3.8.2 Staff retrenchment

Public universities in Kenya were forced to retrench staff at a time when the study was in progress. This was one of the World Bank's conditions for the resumption of aid to Kenya .The University of Nairobi library alone retrenched 52 of its 76 low cadre staff who mainly included library assistants and library attendants. This forced the researcher to adjust his time allocation between project and office work to allow for participation in an adjustment campaign to help the remaining staff cope and come to terms with implications of the retrenchment.

3.8.3 Return of questionnaires and delayed responses

The return of questionnaires was slow due to poor postal services which resulted in posted material not arriving soon enough. Some librarians did not respond on time citing pressure of work. This caused delay in the commencement of the data analysis.

3.8.4 Loss of marked manuscripts through post office

The marked assignments which were posted in South Africa by supervisors failed to arrive on several occasions. This caused long delays that slowed down the progress of the project. The supervisors later on resorted to sending the feedback through the e-mail service.

3.8.5 Logistical problems

Distance supervision caused logistical problems that resulted in long delays particularly in the preparation of reports and other supervisory issues relating to the project. To a

great extent, this contributed immensely to the long period it has taken to submit the dissertation.

3.8.6 Change in supervision

There was a change in supervision midway through the writing stage. This meant working once more through chapter-by-chapter to the end of the project with the supervisors that were later assigned to guide the researcher through the study.

3.8.7 Pressure of work

The researcher was promoted to head a college library. The added responsibilities that came with the position included overseeing operations in 13 centre libraries within the college apart from managing the campus library. This partly contributed towards the delay in completing the project.

3.9 SUMMARY OF THE CHAPTER

A descriptive research methodology was used in the study to collect data. The various aspects of research such as state of the art, possible behaviours, attitudes, values and characteristics were described and captured using the following instruments: questionnaires, participant observation, interviews and review of the related literature.

Two sets of questionnaires were used to collect information from all the university libraries in Kenya and selected library patrons respectively.

Out of 31 periodical librarians working in university libraries in Kenya, 27 filled in and returned the questionnaires, and out of 360 university library patrons (fourth-year research students), 316 filled in and returned the questionnaires.

The participant observation method was used by the researcher to identify trends and concentrate on the following aspects of periodical usage: research topic/aspects/and concepts, user views, beliefs, experiences, expressed satisfaction, and to see if the

available indexes were adequately facilitating access to information required by university researchers.

The observation method involved a total of 118 fourth-year commerce students who were working on their final year research projects. The patrons were observed by the researcher as they carried out their research for information required for projects during the study period. The observation stage required that the researcher be there and participate in the process without the users knowing his intention. This made the Commerce Library of the University of Nairobi where the researcher was working as the librarian, a suitable site for gathering information from patrons needed to answer research questions.

Interviews with librarians were used as a follow-up to the questionnaires and observations to check on and have emerging issues clarified further. Document analysis of existing indexes was also done. A total of 27 librarians from university libraries who had responded to the questionnaires were interviewed.

Pertinent literature was also used to inform this study with regard to the principle, development and practice of periodical indexing; information retrieval performance; and in-house indexing. The information gathered was used in the discussion of results in addressing research questions on the influence of theory and practice of periodical indexing; notable development in periodical indexing; effects of indexing on retrieval performance and the concept of aboutness.

Data analysis is discussed in Chapter 4.

CHAPTER 4

DATA ANALYSIS AND PRESENTATION

4.1 INTRODUCTION

This chapter presents the findings of the study. The findings are presented under the following headings: responses and respondents' profiles; findings based on library users' responses; findings based on librarians' responses; findings based on observations of library users; and findings based on follow-up interviews.

4.2 RESPONSES AND RESPONDENTS' PROFILES

A total of 27 (87.1%) librarians – who included 3 university librarians, 13 senior librarians, 11 librarians, and 316 (87.8%) library users completed and returned questionnaire "A" and "B" respectively. A total of 118 library users who had completed the questionnaires were observed whilst making use of the library services and their responses recorded during the study. As a follow-up on questionnaire responses, 27 librarians were interviewed.

> It was noted that among the librarians, 7 had worked for up to 5 years; 6 had worked for 6 to 10 years; **7** had worked for between 11 and 19 years; while 7 had worked for between 20 and 40 years. The respondents were therefore well skilled and their responses portrayed the desired experiences.

4.3 FINDINGS BASED ON LIBRARY USERS' RESPONSES

The library users' responses on various aspects of the study are provided under the following headings: patterns and access; methods of identifying and accessing periodicals literature; need for assistance in identification, access and interlibrary loan services; search specificity; use of indexes to periodicals; availability of cited periodicals articles; and assistance given to users of periodicals by librarians.

4.3.1 Patterns of access to and use of periodicals held in university libraries in Kenya

The patterns of access to and use of periodicals held in university libraries in Kenya are presented under the following subheadings: the most commonly consulted periodicals; frequency of use; and purpose for which periodicals are consulted.

4.3.1.1 Most commonly consulted periodicals

On the question that sought to determine the usage of various categories of periodicals, 198 (62.7%) of the respondents indicated that they commonly consult journals; 206 (65.2%) consult magazines; 304 (96.2%) consult newspapers; while 4 (1.3%) indicated that they do not use any of the mentioned categories of periodicals. The usage of the various categories of periodicals is described as summarized in Table 4.1.

Table 4.1: Categories of periodicals commonly consulted by research students (N=316)

Category	No. of users	Percentage
Journals	198	62.7
Magazines	206	65.2
Newspapers	304	96.2
None of the above	4	1.3

Thus the majority of the researchers consult newspapers with just over half using journals. It was noted that contrary to expectations, usage of journals for purposes of scholarship and research was poor when compared to other periodicals.

4.3.1.2 Frequency of use of periodicals

The frequency of use of periodicals is provided in Table 4.2.

Table 4.2: Frequency of use of periodicals (N=316)

Frequency of use	Respondents	%
Daily	158	50.0
Weekly	56	17.7
Occasionally	98	31.0
Rarely	2	0.6
Never	2	0.6

Table 4.2 reveals that 158 (50.0%) respondents consult periodicals daily; 56 (17.7%) consult weekly; 98 (31%) consult occasionally while 2 (0.6%) rarely consult periodicals. Two (0.6%) library users have never consulted periodicals. Thus the frequency of use is generally high given that majority of the researchers consult periodicals daily.

4.3.1.3 Purpose for which periodicals are consulted

The purpose for which periodicals are consulted was rated by library users as summarized under the various categories of periodicals below.

Table 4.3: Rating of role of journals in order of priority (N=316)

Role of journal	Priority ratings (1–5)				
	1	**2**	**3**	**4**	**5**
Research information	84	66	60	34	6
Class assignments/projects	58	90	40	44	2
Catching up with news	130	48	76	10	-
Leisure reading	16	84	40	102	10
Others	8	8	14	4	90

Journals

In describing the purpose of consulting journals, respondents rated the role of journals as indicated in Table 4.3.

Results in table 4.3 show that few users, i.e. 84 or (26.6%) and 58 or (18.4%), gave journals a first rating for use in research and study respectively. Results also showed that a large number of respondents 130 (41.1%) consult journals for current information. A total of 8 (2.53%) library users indicated that they consult journals for other reasons, such as contacts, employment, advertisements, stock market reports, exchange rates and curiosity, among others.

Newspapers

The priority rating of newspapers is provided in Table 4.4.

Table 4.4: Priority rating of newspapers (N=316)

Role of newspapers	**Priority rating**				
	1	**2**	**3**	**4**	**5**
Research information	22	56	90	84	0
Class assignments/projects	10	48	98	82	6
Catching up with news	248	32	16	2	4
Leisure reading	16	164	38	54	12
Other	2	2	10	10	96

The rating suggests a good knowledge of the purpose of consulting newspapers by the majority of the users, as important sources of information on current affairs that has no limitation in scope and coverage so long as the issues constitute matters of topical importance and have anticipated utility to newspaper readers. Some issues of newspapers contain useful contemporary information; some even have feature articles covering certain issues, which constitute strong and useful case points that may be cited in research projects.

4.3.2 Methods of identifying and accessing periodical literature

Respondents were asked to indicate the methods, which they employ in identifying and accessing articles on given subjects from periodicals.

Their responses were as indicated in Table 4.5.

Table 4.5: Methods used by library users to identify articles & references from periodicals (N=316)

Method used	Frequency	%
Browsing through periodical issues	208	65.8
Reading lists given by lecturers	68	21.5
Using indexes & abstracts	28	8.9
Requesting for literature searches	10	3.2
Lists given by librarians	4	1.3

- *Self identification and accessing*

  According to the results, 208 (65.8%) respondents relied on browsing through issues of periodicals to identify relevant articles; 68 (22.5%) relied on reading lists given to them by lecturers; 28 (8.9%) relied on indexes and abstracts; while only 10 (3.2%) indicated that they relied on the librarian for assistance in identifying relevant periodical articles. Thus the majority of the researchers rely on browsing through issues of periodicals while only a small fraction is given reading lists by lecturers and librarians.

- *Library assistance in identifying periodical references and articles*

  168 (53.2%) respondents indicated that the library assists them to locate references and periodical articles while 148 (46.8%) indicated they are not given any assistance by the library thus reflecting a need for more assistance to cover all students conducting research projects.

- *User requests for literature searches*

  110 (34.8%) respondents indicated that they normally give their librarian details of their literature requirements while 198 (62.7%) respondents indicated they do not

give librarians requests for literature searches. Those who have never sought assistance from the librarian indicated that they were not aware that they could be assisted with literature searches by their librarians. Others indicated that librarians were few and often too busy therefore they do not seek assistance. There was a need to enlighten the users on the role of librarians in the provision of information to researchers.

On the question that sought to determine whether or not assisted literature searches were necessary, a total of 276 (87.3%) respondents indicated that such assistance is necessary. Some respondents who never sought assistance remarked that: “they had never needed help”; “they rarely used periodicals”; “that librarians do not help”; “they never knew there was such a service”; and that “only if it were possible”.

- *Alert services*

  48 (15.3%) respondents indicated that the libraries alerted them whenever an article relevant to their research interest was contained in the newly acquired periodicals. Whereas 262 (82.9%) respondents indicated they were never alerted whenever an article in their areas of interest was identified by the library even when their requirements are known. A large number, 256 (81.0%) indicated that they needed to be alerted. One respondent commented that: “if the library does not have a single article on insurance, what can bring there?”[sic] yet the present researcher knew that the library had a number of insurance journals, among others. This demonstrated a lack of awareness on the part of the user.

- *Printouts of articles*

  14 (4.4%) respondents indicated that their library provides printouts of articles on subjects/topics of interest while 298 (94.3%) respondents indicated that their library does not provide printouts. 290 (91.8%) respondents indicated that they would like to be receiving printouts of articles to assist in the selection and access to articles which they need for their projects.

4.3.3 Need for assistance in identification, access and interlibrary loan service

On the question that sought to determine the need for assistance in identifying articles in periodicals held in other libraries, all respondents indicated that they would like to be assisted to identify and access articles in periodicals held in other libraries. This would enable them to visit and use or request resources though the inter-library service.

The respondents made the following comments on why it was necessary for them to be assisted in identifying information contained in periodicals held in other university libraries in Kenya: -

- Some of the articles are likely to be crucial to my area of study/interest.
- Our library does not stock a wide variety of periodicals in my area of interest, there is therefore need to look elsewhere.
- Our library does not have contents pages of periodicals held in other libraries in Kenya as well as lists of newly acquired periodicals held in other universities in Kenya, making identification of research material difficult.
- Our library does not have current awareness services where contents pages of newly acquired periodicals are photocopied and displayed on notice boards for our use.
- Arrangements would greatly assist in research since it is very difficult and in most cases inadequate for us to get the information we need from one library.
- Our library should not only identify the relevant information but also make it available for our use, especially if it is found in other university libraries in Kenya.
- To widen our knowledge in areas which our library does not cover.
- To be able to know the articles contained in periodicals held in other libraries.
- Some of the information missing in our library is readily available in other libraries of which we are not members.
- We never know where to search for more information whenever our library indicates they cannot provide.

4.3.4 Search specificity

On the question that sought to determine whether users need to limit searches to specific points-of-view, concepts covered and methodologies used in studies, 260 (83.3%) of the respondents indicated that they required the aspects specified. Of those that required the specified aspects, 246 (77.8%) of the respondents indicated that it was not done.

On the question that sought to determine if users are assisted by their libraries to narrow down their searches of articles with required points of view, concepts and methodologies, 230 (72.8%) of the respondents indicated that their libraries did not offer such assistance.

Some respondents indicated that they had never sought help from their librarians. Others reckoned that they were not aware of some services that were provided at an individual level which could assist in their research, particularly in their search for articles. Others indicated that they only received this through their lecturers (e.g. research methodology). The need to inform users of what libraries could do to assist researchers to gain access to articles meeting their specific requirements was therefore noted.

4.3.5 Use of indexes to periodicals

Respondent**s** were asked to indicate whether or not they made use of the indexes to locate periodical articles and whether or not they sought the librarians' assistance to use the indexes. Concerning what they thought of periodical indexes, the majority of the respondents (i.e 298) representing 94.3% indicated that they were not aware of what indexes to periodicals were. Only 18 (5.7%) respondents knew what they are. Thus, the majority of the university library users did not know what a periodical index is.

On the question that sought to determine whether respondents were aware that a periodical index is a tool for locating articles published in periodicals, 160 (50.6%)

respondents indicated that they did not know the role of a periodical index and how to use indexes.

Of those respondents who did not know how to use indexes, 168 (53.2%) indicated they had not tried to seek a librarian's assistance in the use of indexed periodicals. One respondent remarked thus: "I doubt whether I would like any such assistance, so I find no need asking." Others indicated that some librarians were unwilling to assist and saw it as a bother to them.

4.3.6 Availability of cited articles

On the question that sought to determine the availability of cited periodical articles in the documents users consulted, only 68 (21.5%) respondents indicated they found all or most of the articles in the library. The majority indicated that they became excited when they found references to articles needed, only to be disappointed when they found that none of the articles were available in the library. In most cases, no further effort was made to assist users to obtain the articles in their libraries.

4.3.7 Overall rating of assistance given to users of periodicals by librarians

Respondents were asked to rate the assistance they received from the library in their usage of periodicals. They described the assistance as indicated in table 4.6.

Table 4.6: Assistance given to users of periodicals (N=316)

Description	Respondents	Percentage
Excellent	8	2.5
Good	116	36.7
Minimal	170	53.8
Nil	12	3.8

According to the results, very few respondents 8 (2.5%) described the assistance given to them during usage of periodicals as excellent; 116 (36.7%) described the assistance as good; 170 (53.8%) described the assistance as minimal; while 12 (3.8%) indicated that they were not given any assistance during their use of periodicals. The need for more assistance was expressed since over half of the respondents i.e. 182 or 59.5% described the assistance as either being minimal or nil at that point.

Additional comments made by the library users about the quality of the service accorded by the library in their usage of periodicals summarised the plight of library users in Kenya. Some of the comments on the type of service accorded them by the library during their usage of periodicals were as follows: I am not aware of the kind of services available at the library for periodicals users; the library should make users aware of the services so that they can make maximum use of them; the library should diversify periodical titles acquired to meet our requirements; we are only directed to where the periodicals are and not to the contents of the periodicals; not pleasing; and, more should be done to assist users.

4.4 FINDINGS BASED ON LIBRARIANS' RESPONSES

The data collected on various aspects using questionnaires that were completed by librarians is provided in this section under the following subheadings: holdings of periodicals; identification; access and usage of periodicals; availability of periodical indexes in university libraries in Kenya; and feasibility for in-house indexing.

4.4.1 Holdings of periodicals in university libraries in Kenya

The study sought to determine the strengths in holdings of periodicals as background information to the feasibility of in-house indexing of periodicals in university libraries in Kenya.

The approximate size of bound volumes of periodicals held in university libraries in Kenya were according to responses as reflected in Table 4.7. From the analysis of the responses, it was established that university libraries in Kenya hold several volumes of

bound periodicals. Between them the libraries that responded hold over 200 000 bound volumes and several issues of loose periodicals.

Table 4.7: Bound volumes of periodicals held in university libraries in Kenya (N=27)

Volumes held	Number of libraries	Percentage
1-100	1	3.7
101-200	1	3.7
201-500	2	7.4
501-1,000	5	18.5
1001-5,000	7	25.9
5,001-10,000	4	14.8
10,001-20,000	2	7.4
20,001-50,000	3	11.1
Above 50,000	2	7.4
TOTALS	**27**	**100**

The results reveal that the strength in holdings of periodicals varies from library to library and reflects on the stage of development of the university with one holding as few as 60 volumes while others hold over 50 000 bound volumes. However, on average, the size of holdings for most libraries is low for university libraries.

4.4.2 Identification, access and usage of periodicals in university libraries in Kenya

On the issues of identification, access and usage of periodicals, the librarians were asked to (a) indicate the methods preferred by library patrons when identifying information in their libraries and (b) state how libraries assist users to locate information from periodicals.

4.4.2.1 Methods used by library users to identify periodical articles

It was necessary from the librarians' point of view to investigate the methods employed by patrons to identify articles, to be able to determine whether the methods, enabling users to identify relevant articles from the periodicals held in the libraries, were effective.

Results indicated that 22 (81.5%) of the 27 librarians that responded indicated that users preferred to browse through issues and volume of periodicals; 18 (66.7%) indicated that the reading lists given by lecturers are preferred by the users; 8 (29.6%) use citations lists given by librarians; 12 (44.4%) use printed indexing and abstracting journals; 3 (11.1%) use online searches; 3 (11.1%) use locally produced article files; and 3 (11.1%) use in-house computers databases (see Table 4.8).

Table 4.8: Methods used by library patrons to identify periodical articles (N=27)

Methods of identification of relevant articles	Responses	%
Browsing through issues & volumes	22	81.5
Reading lists given by lecturers	18	66.7
Using acquired indexing and abstracting journals	12	44.4
Lists given by librarians	8	29.6
Online searches	3	11.1
Locally produced periodical article files	3	11.1
In-house databases	3	11.1

The results show that in the majority of the libraries access is through browsing (81.5%) and lists given by lecturers (66.7%). The citations or lists given by librarians are used in less than half (44.4%) of the libraries while locally produced indexes and online searches are used as a method of identification in only 3 or 12% of the libraries that responded.

4.4.2.2 Librarians' assistance in identification of periodical articles

Remarks made by respondents indicated that efforts were being made by individual libraries to assist users to identify articles contained in periodicals. For periodicals held in their collection assistance included: instruction in the use of printed indexes available; conducting online literature searches on request; assistance while searching for journal literature on the Internet; advising users to browse through loose issues and bound volumes of periodicals; conducting searches using printed indexing and abstracting journals; sending current awareness lists and tables of contents to lecturers whenever new issues were received; indexing by subject followed by filing the cards alphabetically for the purpose of meeting future search requests; and photocopying and posting titles of articles and tables of contents on the notice boards.

In the case of periodicals held by other libraries, assistance was offered through the inter-library loan services. This was done when users came with bibliographic information of the articles they needed. Using periodical lists and indexes from individual libraries and institutions that compiled them and user referral services to libraries likely to be holding periodicals in known subject areas, is used by library users to locate information from other libraries. For instance referring users to a library, serving a faculty of medicine, for periodicals in medicine.

4.4.2.3 Identification through printed indexes using terms given by library users

Only 4 (14.8%) respondents described the identification of periodical articles listed in printed indexes using terms given by library users as always possible; 15 (55.6%) described identification as only possible sometimes; 7 (25.9%) described access as rarely possible. One respondent indicated that their library never received articles from printed indexes using terms given by library users (see Table 4.9). The results indicated that the majority of librarians 22 (81.5%) rarely or only sometimes are not able to access periodicals articles using terms given by library users.

Table 4.9: Access to periodical articles in printed indexes using terms given by library users (N=27)

Description of ability to access	Frequency	Percentage
Always	4	14.8
Sometimes	15	55.6
Rarely	7	25.9
Never	1	3.7

4.4.2.4 User profiles

On the question that sought to determine whether libraries have user profiles which librarians can use to assist them effectively, only 4 (17.4%) respondents indicated that they maintain a periodical user profile, while 19 (82.6%) did not maintain user profiles. Some of the user profile details maintained by university libraries according to respondents include: user name; department/course/address/occupation; category (student/lecturer/profession); study level (PhD, Master's and undergraduate); topic/area of specialization; date of request; and date of completion/deadline. The need for libraries to maintain user profiles was noticed during observations and expressed by those interviewed. The profile details have to contain all elements required to service a typical request for periodical information by university users.

4.4.3 In-house indexing practices in university libraries in Kenya

Several questions were posed to the respondents with regard to the libraries' practices on the in-house indexing of periodicals. In some instances, the respondents were asked to justify their answers to particular questions. The first question required the respondents to indicate whether or not they index some of their periodicals in-house; 9 respondents, representing 33.3% of the total number of surveyed libraries, indicated that they index some of their periodicals in-house; while 18 (66.7%) of the respondents indicated that they do not index their periodicals. The latter largely rely on indexes prepared elsewhere such as *Readers Digest to Periodical Literature, British Humanities*

Index, Accountants' Index, Ngarua Periodicals Index, The Weekly Review Index, and Social Science Citation Index.

Of those that do not index their periodicals, 8 (30.8%) of the total respondents indicated that they had no plans of indexing their periodicals; 12 (46.2%) indicated that they had plans to start indexing their periodicals in-house. Those who indicated that they did not index their periodicals were asked to state the reasons. Some of the reasons cited by libraries for not indexing in-house are as summarised in Table 4.10.

Table 4.10: Reasons cited for not indexing in-house (N=18)

Reason for not indexing in-house	**Response (number of libraries citing the reason)**	**%**
Unnecessary	3	16.7
Lack of time	5	27.8
Shortage of staff	6	33.3
Lack of expertise	3	16.7
Lack of computing facility	1	5.6

Responses to reasons why libraries did not index were as follows: shortage of library staff 6 (33.3%); lack of time for indexing 5 (27.8%); indexing considered unnecessary 3 (16.7%); lack of expertise 3 (16.7%); while 1 (5.6%) does not index due to lack of computing facility. The libraries that considered indexing of their periodicals to be unnecessary cited two reasons namely: most of what they receive is not scholarly and therefore does not warrant indexing; and that good indexes are available on the market and there is therefore no need for in-house indexing.

Respondents were asked whether in-house indexing could enhance usage of periodicals held by their libraries. All 27 (100%) respondents indicated that in-house indexing would enhance usage of periodicals held in their collection. This suggests that in-house indexing is important and the libraries should consider indexing their

periodicals. This was supported by remarks made by library users and the observations made in this study, that this would enhance their ability to identify relevant periodical articles.

On the question that sought to determine the need for an index covering all periodical holdings, 24 (88.9%) of the librarians indicated that they needed a comprehensive index covering articles contained in all periodicals held in their libraries. Only 3 (11.1%) indicated that they did not need a comprehensive index since the ones in existence met their requirements.

On the question that sought to know the options relied upon by libraries that did not consider it necessary to compile subject-specific indexes or have comprehensive indexes covering articles contained in all periodicals held in their collection, respondents indicated that they relied on the following: photocopying of contents pages; subscriptions to printed indexes; searching international online databases; and searching CD-ROMs.

Of the total number of libraries that responded to the question on the types of periodicals they index, 9 (100%) index journals; 4 (44.5%) index magazines; and 5 (55.6%) index newspapers. Categories of periodicals indexed in-house by university libraries in Kenya were as given in table 4.11.

Table 4.11: Categories of periodicals indexed in-house by university libraries in Kenya (N=9)

Category of periodicals	Number of libraries	%
Journals	9	100
Newspapers	5	55.6
Magazines	4	44.4
Others	1	11.1

Results show that only journals are indexed by all the nine libraries. This is contrary to the retention policies of information centres. The fact that a periodical finds a place on the university library shelves means that it is useful and therefore has to be given full processing, which in this case should include indexing. All the periodicals retained as part of the library collection should be indexed to enable those interested in the information therein to quickly identify and access it.

On the question that sought to know reasons why libraries index periodicals in-house, respondents observed that their libraries index periodicals in order to:

- improve on usability of journals by exposing journal articles by subject;
- provide a subject approach to contents of their journals;
- expose subjects of articles contained in the journals;
- assist those seeking information to have easier access to the periodical articles; and
- facilitate the identification of relevant articles.

Respondents that index newspapers and magazines cited the following reasons for indexing newspapers:

- To expose information relevant to courses taught – newspapers and magazines are the most regular sources of current information/news, this should be exposed through indexing.
- In order for library users to be aware of the information contained in them and access it faster.

Respondents were also asked to state their policies on the periodicals to be indexed, the responses by the nine libraries that responded to the question were as follows: index current issue only, 4 (44.4%); index selected periodicals only, 2 (22.2%); index articles on certain subjects only, 2 (22.2%); and index all issues received, 1 (11.1%).

On the question that sought to identify the factors influencing decisions on what to index, respondents cited the following**:** usability of the information for university library

users; timeliness/currency of the content of the article; which aspects to include in the index language; number of terms to be assigned per article; which terms constitute the most accurate description of the article; and which terms are likely to be used by the users to search for the article. These key decisions address the concept of aboutness of the article or information being indexed and user requirements.

On the question that sought to know whether differential indexing is necessary or not, 37.0% of the respondents indicated that there exists a need for differential indexing to cater for user needs more effectively and 48.1% respondents indicated there was no need for differential indexing. Respondents who considered it necessary to have differential indexing cited the following reasons: the approach would help to meet unique requirements such as research methodologies and the point-of-view of their information needs, etc; and to maximise the use of periodicals by enhancing awareness of various aspects of the articles contained in the periodicals.

Respondents who did not consider it necessary to do differential indexing argued that: it would be duplicating efforts because a good number of undergraduates returned for postgraduate studies to use the same materials; one level of indexing should suffice in the academic library; at university level, users should be able to use the facility indiscriminately; all the users could be looking for the same information; separation might deny some users access to the articles; and that concepts/subject headings for a given article remains the same.

On the question that sought to determine approaches (methods) used to index periodicals, only seven of the 9 libraries that index in-house responded as shown in Table 4.12.

Table 4.12: Indexing approaches used by university libraries that index in-house (N=7)

	Indexing approach	Frequency	Percentage
a	Based on aboutness and concept analysis	3	42.9
b	Based on user requirements	1	14.3
c	Both **a** and **b** above	3	42.9

Results show that libraries which index their periodicals in-house use three approaches (methods) namely: based on aboutness and concept analysis (42.9%); based on user requirements (14.3%); on both aboutness and user requirements (42.9%). Thus the libraries use both, the aboutness approach and concept analysis and user requirements to index periodicals.

Of the nine libraries that index in-house 5 (55.6%) indicated that they index manually while 3 respondents (33.3%) indicated that they index with computer assistance. One library did not respond.

4.4.4 Indexing and abstracting journals

Only 4 (14.8%) librarians indicated that their libraries had subscribed to current indexing journals while 23 (85.2%) of the respondents indicated that their libraries did not subscribe to indexing and abstracting journals citing lack of funds as the main reason for non-subscription.

4.4.5 Online databases

Respondents were asked to indicate whether or not their libraries had access to online databases. Only 8 (42.1%) of the libraries indicated that they do. Of the 27 libraries, only 6 (22.2%) respondents indicated that they subscribe to online databases namely; *EBSCO*, *Emerald* and *JSTOR*. Among the ones that did not subscribe, two indicated that they have access to donated databases and are also able to search databases on

the Internet which allows free access. 2 of the libraries indicated that they have free access to: *CAB (Commonwealth Agricultural Bureau) Abstracts* and *Tropical & Rural Current Contents* while 4 indicated that they subscribe to Social *Science Citation Index (SSCI) and Science Citation Index (SCI)*. Those libraries that do not subscribe to online databases indicated that lack of funds, lack of Internet connectivity, lack of computers and lack of vision, were the main impeding factors.

Respondents were asked to rate their satisfaction level with host database services and only 1 out of the 6 that responded, expressed the degree of satisfaction with host database services as excellent; 3 libraries described satisfaction as good; while 1 library described the services as being moderately good. One library described host databases services as unreliable. Satisfaction of host database services in terms of response time, convenience and others, was described by libraries that use them as indicated in Table 4.13.

Table 4.13: Expressed satisfaction with host database Services (N=6)

Description of satisfaction	Frequency	Percentage
Excellent	1	16.7
Good	3	50.0
Moderately good	1	16.7
Unreliable	1	16.7

The results indicate that on average university libraries are satisfied with host services. However, the majority of those interviewed and from observations made, it was clear that the ideal situation would be if these databases were used alongside in-house databases comprising of articles indexed in house from periodicals held in their libraries, since most of these lack local information often sought by researchers.

On the questions about response times for overseas databases among the libraries that access international databases, 2 (25.0%) indicated that response time was very quick,

3 (37.5%) of the libraries that responded to this question indicated that it was moderately quick; while 2 (25.0%) indicated it was slow and 1(12.5%) indicated it was very slow (see Table 4.14).

Table 4.14: Response time on overseas online searches (N=8)

Response time	Frequency	%
Very quick	2	25.0
Moderately quick	3	37.5
Slow	2	25.0
Very Slow	1	12.5

Results indicate that only 2 (25%) of the libraries that access international databases get reasonably fast responses. The rest do not. Response time needs to be quick since taking too much computer time increases costs. For libraries that experience slow to very slow response, need for searching during off peak hours is evident. In some cases, libraries get messages that the database is unavailable. This was described as a common feature during the day when the usage is high. User requirements cannot be met effectively when response time is low. Need for each library to have an in-house database that can be searched to give users at least some references while waiting for the Internet to be available or when the response time is slow, is evident.

On the question about the possibility of searching host databases in the event of non-renewal of subscription, 4 (66.7%) of the 6 libraries that subscribe to databases indicated that they had not been allowed to continue searching databases for years already, renewed (paid for) in the event of non-renewal to subsequent subscriptions. Libraries are denied access to the databases once their subscription expires and can therefore not search the databases even for years renewed in the past. Developing one's database ensures that you can search indefinitely.

When asked about whether repackaging data held in host databases to suit user demands is allowed by database providers, to all the 6 (100%) respondents indicated that they repackage data held in host databases once subscription has been renewed for their clientele only. On the question that sought to determine whether there was a need for libraries to develop own databases to be used alongside databases currently subscribed to, the 6 (100%) respondents that subscribe to databases indicated that it was necessary. Respondents also considered it necessary to develop an in-house database to be used alongside the commercial databases, as this would cater for indigenous information that host databases do not seem to cover in some cases.

4.4.6 Prospects of in-house indexing in university libraries in Kenya

Staff requirements, IT facilities, joint initiative, benefits and willingness of libraries to index in house were investigated to determine the prospects for in-house indexing in university libraries in Kenya.

4.4.6.1 Staff requirements

The qualification level of the staff involved in the classification of books, indexing of periodicals, and those with formal training in indexing was investigated to determine the potential and availability of staff in libraries for in-house indexing.

In the majority of the libraries, 22 (81.5%) respondents indicated that the classification of books is done by librarians. Library assistants with diploma and certificate qualifications in Library and Information Science complement the technical staff. Eight (29.6%) respondents indicated that they have at least one librarian involved in the indexing of periodicals while 19 (70.3%) respondents indicated that they do not have any librarian involved in indexing.

The results reveal that the number of librarians involved in indexing is small. The results also revealed that university libraries in Kenya have employed a number of librarians to classify books. The libraries may be able to employ more librarians to index periodicals, if there is sufficient justification to their parent institutions of the need to index. This was

suggested during interviews with librarians. Although the numbers are still small, some libraries have among their staff, librarians who are currently involved in the indexing of periodicals. It was however established that this is only done when there are no books waiting to be catalogued by the librarians.

On the question that sought to identify staff who have formal training in indexing, 24 (88.9%) respondents indicated that some of their staff have undergone formal training in indexing. The numbers of staff with training in indexing for each library are summarized in Table 4.15.

Table 4.15: Number of staff with training in indexing in university libraries in Kenya (N=27)

No. of trained indexers	Libraries	Percentage
0	3	11.1
1	7	25.9
2	5	18.5
3	2	7.4
4	1	3.7
5	1	3.7
7	1	3.7
10 and above	7	25.9

Table 4.15 shows that at least one member of staff in each of the 24 libraries has taken of formal course in indexing. Seven libraries have at least 10 staff members with formal training. The response from the University of Nairobi Library indicated that the library has over 100 staff members who have taken an indexing course, a situation that reveals the existence of skilled manpower in university libraries in Kenya that can be deployed to index periodicals.

4.4.6.2 Availability of information technology (IT) facilities for in-house indexing

A question, seeking to find out the availability of information technology (IT) facilities and their application to library operations and in-house indexing was posed to the university librarians. Eight (29.6%) of the 27 respondents indicated that they have automated their housekeeping systems such as cataloguing and circulation, while 19 (70.4%) of the libraries that responded have not. Thus, the majority of university libraries in Kenya are largely operating manually. The interviews also revealed that librarians have not been aggressive enough in justifying the need for computers as basic tools for information storage and retrieval. Where this has been done, the libraries have been allocated adequate computers to meet their ICT requirements. Responses indicated that 22 libraries have 10 or more computers. Some of the libraries, for instance University of Nairobi Library, Moi University Library, United States International library, Egerton University Library, and Kenyatta University of Agriculture and Technology Library have over twenty computers. Most of the libraries are connected to the Internet while others are working on connectivity. Nine (33.3%) respondents among those who do not use computers, indicated that they have plans to use computers for in-house indexing while 12 (44.4%) indicated that they do not have such plans at the moment. The respondents who do not have plans at present to use computers for in-house indexing cited the following reasons: the library has not designed an in-house programme for the indexing project; they are struggling with processing of book backlogs; indexing is not a priority; staffing shortage; and indexing is unnecessary.

4.4.6.3 Collaborative periodical indexing

The study also sought to investigate whether there was an expressed need for a joint indexing initiative; reasons why libraries considered such initiative as being necessary; and why some gave the venture low priority**.** 25 (92.6%) respondents indicated that it was necessary for university libraries in Kenya to jointly make an effort, involving the indexing of their periodicals and putting up a database accessible to all university libraries for the purpose of effective resource sharing, while 2 (7.4%) indicated that it was pointless to duplicate work already done by existing major international indexing centres and that this should only be done selectively.

All 27 (100%) respondents indicated that it was important to index all locally published periodicals, as these were not effectively catered for by existing indexing services. All respondents indicated that there was a need to index all periodical holdings of university libraries in Kenya for maximum usage. Further, and by so doing it will expose the clientele to a wider variety of articles contained in periodicals beyond holding of individual libraries, which was not happening at the moment.

The respondents who described a joint indexing effort as being necessary cited the following reasons:

- it will facilitate faster and richer research searches
- it will help in resource sharing
- it will provide awareness about the knowledge base in the country particularly in situations where the computers are fully linked through a network
- it will increase consistency and cut down on duplication of resources and effort
- it will provide access to wider resources and thereby enhance the sharing of resources amongst the libraries
- users will be more informed of what other libraries have and are doing
- it will act as a marketing tool of the local university to the international community
- it will minimise the problem of duplication of efforts
- it will save time and money spent by the user when looking for information
- it will enhance dissemination of information and
- it will enable university libraries in Kenya to own a database on the Internet and realise a feeling of ownership and leadership as pacesetters in the provision of information in Kenya.

The respondents who placed a low priority on the collaborative indexing of periodicals argued that: there is no point of duplicating work already done by major indexing agencies; and that only locally published periodicals need to be indexed and the volume for this is currently small and therefore not warranting such joint effort.

4.4.6.3 Benefits for libraries indexing own periodicals holdings

Benefits which can be realised if libraries indexed their own periodical holdings were cited by respondents as follows:

- it will provide easier, faster and convenient access to periodical literature held when entries are stored in a computer;
- it will be easier and faster to locate and retrieve periodical information from periodicals held in the library when the periodicals are indexed;
- more users will be made aware of the useful existing information in periodicals and therefore, will use the library more effectively and profitably;
- it will increase usability of periodicals since their contents will be exposed;
- it will facilitate research with evidence and better quality research output emanating from a better literature review following increased utility of indexed periodicals; and
- it will be possible to incorporate terms which users refer to most when they come for service and therefore reduce chances of retrieval failures.

All the 27 (100%) respondents indicated that it would be beneficial for libraries to index their periodicals and also indicated that in-house indexing would enable libraries to:

- design and develop their own databases tailored to meet their user's requirements. This will include modifying some of the references from the existing databases by adding search terms and placing emphasis on useful aspects that may have been considered to be less important by the vendors. This will result in more effective servicing of local requests that would have yielded nil hits. User satisfaction is therefore likely to improve with the establishment of in-house databases, making them more cost effective.
- ensure that all information contained in periodicals and considered to have some utility to university information seekers, is indexed and put into the in-house database for online searches. This will enhance usage of existing periodicals and make it more cost-effective to continue acquiring and maintaining the periodical collection.

- invest in information by developing in-house databases and offer these on the Internet, to be searched by the rest of the world. At the moment, none of the university libraries in Kenya has a database that is generating income. If established, these databases are likely to be cheaper than some of the international databases currently being searched. This would be of great benefit to the majority of libraries that have indicated that they cannot afford to access international databases due to financial constraints.
- download contents of the databases of international databases that allow subscribers to download, once renewal has been affected. This would be cost-effective since subsequent searches on the same topic would be done in local databases and hence libraries would save on international communication charges (access time). The realisation of multiplier effect through use of local databases to conduct repeated searches on the same topics for students doing the same unit, which has been seen to be a factor of common occurrence by this study, makes the development of in-house databases cost-effective.
- print search results conducted on in-house databases, modify these as the need arises, without spending as much money as when connected to international databases. Local expenses incurred are minimal, compared to when searches are made on international databases and when lists are made manually to meet search requests.
- conduct searches on the in-house databases indefinitely, unlike when they are locked out for non-renewal by some international databases, making it difficult to access and search for years already renewed. The security that goes with ownership of the database and ability to dictate conditions according to institutional requirements makes it more realistic for libraries to develop local databases and arrange to search other available databases (both local and international), whose conditions are favourable and can be met to supplement these.
- store and match user requirements with incoming information by ensuring that all relevant incoming information is given to users whose profiles match the information. This would be more cost-effective than when the data is not

maintained and matched. Since users will hardly know of incoming relevant information, they resort to obtaining it from elsewhere or do without it, making it more expensive to the library in terms of timely document provision, delivery and commitment in ensuring that periodicals held are used to the maximum.

- easily and quickly locate articles on a topic thereby saving on user time by searching the database.
- ensure that once an article has some relevance to a researcher's need, it is identified by searching the databases, retrieved and given to the researcher thereby giving the article more utility ratio.
- to save on photocopy requests. It is more expensive to order articles containing information which is already contained in periodicals yet not known to users/librarians due to non-retrieval for lack of an effective location tool.

4.4.6.4 Willingness of libraries to index their periodicals in-house

On the question that sought to determine the willingness of libraries to index their periodicals, twenty-seven periodical librarians indicated that libraries were willing to index their periodicals in-house. Their responses were as follows: in-house indexing is already in progress, 6 librarians; very willing and ready, 4 librarians; would be willing if the university provided funds for active subscription to current periodicals, 12 librarians; and willing provided that additional staff is employed, 15 librarians. Further, all the respondents indicated that they are willing to join a periodical
indexing project if it is established.

4.5 FINDINGS BASED ON OBSERVATIONS OF LIBRARY USERS

A total of 118 fourth-year students approached the present researcher for assistance in locating articles and information contained in periodicals for their projects during the study period. All 118 library users who approached the researcher during the study period were included in the study and consequently observed using a scheduled checklist as a guideline. The checklist covered attributes considered useful to the study. The number of users who sought assistance was less than half of the total number of registered library users engaged in research during the study period.

Remarks noted during observations with library users revealed that the usage was low as most users did not know of the existence of information relevant to their projects and were generally not sure they would get useful information from existing periodicals. The researcher noticed that there was a need to engage in promotional activities to have all users come for assistance during their search for information contained in periodicals.

From the observations it was established that the information sought by library users from periodicals was expected to assist them in their research projects. Deadlines were the main condition of concern. With statements such as: “I would like the information by this time, after which, I will not require it.” All the 118 users who approached the researcher gave deadlines by which the information was to be given, for it to serve the purpose. In the majority of the cases, the researcher was not able to provide instant assistance to the users since searches were done manually and involved browsing through several volumes of periodicals to get some articles. Such users were asked to check after a few days except for cases where some references were located in the in-house index. This revealed the need for a fast retrieval system/tool. This need was critical since most users were not giving enough time for searches to be conducted and it was evident that the ideal system for identification and access to relevant information needed to be fast and to have the capability of addressing individual biases. The topics sought were direct and mainly centred on one concept.

The speed which users took to identify the articles/information from periodicals was observed to be slow. The users, apart from being assisted by the library staff, relied on browsing, occasionally in printed indexes prepared elsewhere and *CD-ROM* searches. Browsing through the issues and volumes of periodicals for retrieval of relevant articles was described as both unsatisfactory and cumbersome and was often time-consuming. Sometimes it could mean searching through a number of issues without getting any relevant articles/information.

The number of cited references in both printed indexes and *SSCI (CD-ROM)* was observed to be low. The majority of the cited articles could not be supplied by the library and no effort was made to get them from overseas, as the users were not able to pay for the articles. It was also observed that the indexes (e.g. *Accountants' Index; SSCI)* held at Lower Kabete Library, where the document study was conducted, were last subscribed to in 1992. The indexes can be said to be of no use to some researchers interested in current information.

Although the students were less discriminating and ready to look at any information so long as it was on their topic of interest, it was observed that for users who required search concepts to be combined, this was not easily possible as the printed indexes relied on pre-coordinated terms and therefore did not allow for post-coordination of terms sought. The researcher found the combination of concepts a requirement for a growing need that should be addressed by good retrieval systems.

Observations made during this study indicate that in a number of cases, users' research on topics have similarities. In such cases, libraries are likely to avoid making repeat searches on the same topics and service subsequent requests on similar topics by using data stored in the in-house databases.

During the observations, the researcher overheard library users make remarks, which revealed that most of the users were not aware of the existence of articles that could assist them in their research. For instance, some respondents remarked that they did not know of core journals on subscriptions yet some of these were in their areas of interest.

The need for more information or articles from other libraries was expressed by all users. In a number of cases, the researcher could see the need was quite evident, but it was difficult to establish whether the libraries had articles relevant to the users' needs due to the absence of a locating tool or guide to search for articles contained in

periodicals held in other university libraries in Kenya. The need for such tool was observed in all cases handled during the study.

Overall, it was observed that users' needs are not being met in most cases. For a number of users the number of articles being given is small and need for more articles was observed to be quite evident. For instance, out of 215 relevant articles identified in the *Accountants Index* during the observations, the library was unable to supply any of them and there was no other library in Kenya that held the said periodical articles. On average, users were being given less than 5 articles identified mainly through browsing except for the articles on the subject that had been indexed and put in the library's in-house file that yielded more hits per search. For 56 (47.5%) of the requests, the searches did not yield any relevant article yet the researcher spent a minimum of two days per request browsing through periodical issues held in the library where observations were taking place. In some incidents, cases of late detection were observed, whereby the researcher found articles that could have assisted researchers long after the deadlines as he browsed for other topics or requests.

Although observations were made based on one library, the information gathered through observations covered specific aspects of the study considered to be common to all universities that required a more focused study through participating in the happenings during the study period. The information gathered complemented data obtained through document analysis, interviews and questionnaires, which covered university libraries in Kenya.

4.6 FINDINGS BASED ON LIBRARIANS' FOLLOW-UP INTERVIEWS

Follow-up interviews were held to gather information on aspects that needed further clarification.

A total of 27 librarians were interviewed as a follow-up to the questionnaires' responses. The responses were as follows:

- Only 6 (22.2%) respondents indicated that their library was able to provide a sizeable number of periodical articles during searches to meet the requirements of their researchers. 21 (77.8%) indicated that they were unable to provide enough articles for their research students and staff.
- Only 9 (33.3%) respondents indicated that they were able to readily combine concepts and terms during searches to meet specific user requirements. Their libraries have online access to databases.
- Only 6 (22.2%) respondents indicated that their libraries were able to provide periodical articles to users within a required time frame. The 6 libraries have periodical indexes covering periodicals held in their collections.
- Only 5 (18.5%) respondents indicated that researchers in their libraries were on average satisfied with the quantity and quality of articles given to them during searches.
- A total of 21 (77.8%) respondents indicated that they were not satisfied with the methods used in their libraries to identify articles contained in the periodicals.
- Respondents described browsing as being cumbersome, time-consuming and often frustrating. The searcher was not sure of getting articles relevant to his/her project requirements and the search outcome was left to chance.
- Published indexes were described by respondents as not being effective retrieval tools. Although they identified a lot of articles in the indexes, most of these were not available in their libraries. The retrieval rate was very low and often nil for most searches.
- Lists provided by librarians using locally produced indexes proved very effective. According to respondents, researchers were given all the relevant articles listed and retrieval was done while the user waited.
- Only 9 (33.3%) respondents indicated that they index periodicals held in their libraries. The respondents described the ability of their libraries to identify and supply indexed articles as high. They also indicated that they were able to combine a number of concepts during searches to meet specific user requirements.

- The 18 (66.7%) respondents who did not index their periodicals, indicated that they on the average were unable to identify relevant articles contained in their collections during searches. Hence, relevant articles were never used for lack of knowledge of their existence. Most users give up searching once they browse through a number of periodicals without success.
- The 18 respondents from libraries that do not index, also indicated that the printed indexes do not enable searchers to combine a number of concepts during searches and yet the need for combining concepts was quite evident, given the nature of the projects undertaken by researchers.
- The majority of the respondents, i.e. 24 (88.9%), described the need for researchers to be given assistance in locating more articles from other libraries or information centres as commonly expressed by researchers whilst using periodicals. However, the need is usually not addressed due to lack of indexes covering periodical articles contained in collections held by those libraries and information centres.
- During the interviews it was established that response time that had earlier been described as slow in questionnaires, had improved tremendously with developments in the Information and Communication Technology in Kenya. It was also established during follow-up interviews that some libraries are searching databases and directing relevant articles to in-house databases which they later use to service user requests through stored user e-mails. This is a more recent development that may contradict the findings reported elsewhere in the dissertation.
- Overall, the 27(100%) respondents lamented about their inability to quickly refer and provide researchers, using their collections, with relevant articles contained in their collections not covered in the line databases which some libraries access. They attributed this to lack of indexes dedicated to coverage of all articles contained in periodicals held in their individual libraries. Respondents suggested that steps be taken aimed at improving on the volume, identification and access to articles contained in periodicals held in libraries in Kenya to assist researchers.

In particular, respondents interviewed emphasised on the indexing of all periodicals held in each library for maximum identification of relevant articles contained in periodicals in their collections. According to them, the libraries which do not index their periodicals, are still harbouring the traditional approach of keeping and looking after collections. The present approach is to actively provide information which is not easy unless libraries index periodicals in readiness for provision of relevant articles from the collection. It also calls for usage of computer technology in the storage and retrieval of the indexed data. Libraries should scan and index contents of databases and use these to open in-house files. They should tail or search terms to suit the needs of their users to enhance relevance and maximize utility.

4.7 SUMMARY OF THE CHAPTER

This chapter has presented the findings of the study in line with the objectives of the research questions. The findings, based on library users' questionnaire responses, are presented under patterns of use and access to periodicals; methods of identifying and accessing periodical literature; need for assistance in identification, access and inter-library loan services; search specificity; use of indexes to periodicals; availability of cited periodical articles; and assistance given to users of periodicals by librarians.

The findings, based on librarians' questionnaire responses were presented under the following subheadings: holdings of periodicals; identification, access and usage of periodicals; availability of periodical indexes in university libraries in Kenya; and feasibility for in-house indexing.

The findings based on observations of library users and information gathered during follow-up interviews, are presented.

Discussions of the findings of the study are given in Chapter 5.

CHAPTER 5

DISCUSSION OF THE FINDINGS

5.1 INTRODUCTION

This chapter discusses the findings according to the set out objectives. The discussion covers the following salient issues:

- Periodical holdings in university libraries in Kenya
- Identification of and users' access to periodical literature
- Expectations of users of periodical literature
- Practices of periodical indexing in university libraries in Kenya
- Prospects of in-house indexing in university libraries in Kenya
- Benefits of in-house indexing of periodicals to university libraries in Kenya
- Challenges of in-house indexing of periodicals

5.2 PERIODICAL HOLDINGS IN UNIVERSITY LIBRARIES IN KENYA

University libraries in Kenya hold a sizable collection of periodicals, both bound and loose. While major libraries are fairly strong with two of them holding upwards of 150 000 bound periodical volumes and subscribing to over 30 databases, a number of the smaller libraries are extremely weak with one library holding only 60 volumes and not subscribing to any international database. On average, the holdings of scholarly and research periodicals in university libraries in Kenya are small. The limited holdings are perhaps due to irregular funding, historical development of universities in Kenya and the mode of acquisition of periodicals. The library's sources of the collections include: limited purchases, donations and institutional deposits.

There exists a need for university researchers to have access to information contained in these periodicals through resource-sharing, as the holdings of single libraries are small on average. Also, there is a need for university researchers in Kenya to have access to a wider variety of periodicals in their respective research areas by subscribing to more international databases. The overall position as regards periodical holdings is

that gaps in holdings at all university libraries in Kenya have been increasing perhaps due to the cancellations of subscriptions and the nature of acquisition by individual libraries. The volume and range of periodicals available to library users in a number of libraries evidently needs to be improved if the universities have to continue providing quality academic and research programmes. This has been found to be a problem in most university libraries and is likely to affect the quality of research undertaken by researchers.

5.3 IDENTIFICATION OF AND USERS' ACCESS TO PERIODICAL LITERATURE

One of the services that would make the library patrons most happy is when they have easy access to information. Indeed libraries, particularly those in developed countries provide vast information to users who do not have to physically visit the library as well as arrange to interrogate any information resource that a given library does not stock, available in another library through interlibrary cooperation and networking (Pace 2002:25). This section discusses issues pertaining to the methods and tools employed by users to identify relevant information in the periodical literature as well as the expectations of users of periodical literature with regard to accessing the information contained in periodicals held in university libraries in Kenya.

5.3.1 Methods/tools employed to identify relevant information contained in periodicals held in university libraries in Kenya

A number of methods may be used by library users to identify relevant information in libraries, and periodicals in particular. Library catalogues (both manual and online) are used in libraries to identify resources. In the case of periodicals which by nature contain a number of articles, indexes are used as tools to identify relevant articles. The indexes serve as links between the users and the information covered in periodicals. They provide information on articles contained in issues of periodicals covered by the indexing services, and library users use these indexes to identify current information in various fields of knowledge. Indexes also enable users to obtain archival information by allowing users to conduct extensive searches for information over a period of time. In

using indexes, the users have efficient and systematic means for locating documents or parts of documents that may address their information needs or requests.

The realisation that potentially relevant articles are identified and located using indexes makes university libraries to either subscribe to indexing journals or develop them in-house. With the advancement in information technology, indexes are increasingly available online. This has made it possible for expert searching in order to respond appropriately to information needs, a professional search on the Internet, subscription to a database, or print periodicals, to be undertaken. The users of Michigan University library, where the expert searching method has been in use for over ten years, rated the method as convenient and user friendly (Volk 2007:204).

Several methods are used in the majority of the university libraries in Kenya to identify information published in periodicals. These are: browsing through issues and volumes of periodicals; using lists given by lecturers; and published periodical indexes. Lists provided by librarians are used as a means of identification of periodical information in very few libraries. Online searches conducted on international databases, in-house databases and locally produced indexes are used as a means of identification in some but few libraries. Librarians should therefore play a leading role in assisting periodical users to identify relevant periodical information. There is a need for repackaging some of the references to reflect commonly used terms for articles contained in periodicals and for establishing separate files containing articles that are available in the specific areas of study. This should facilitate timely usage of information in periodicals held by the library and avoid the possibility of retrieval failure that occurs when searches are made under unused terms to access the articles, as is the case in the majority of the university libraries in Kenya.

Only 12 out of the 27 university libraries that responded subscribe to indexing and abstracting journals as well as rely on these for locating periodical articles. Two of the libraries had renewed their subscriptions to indexing and abstracting journals for the pervious year. Thirteen libraries had not renewed subscriptions for more than 10 years;

the majority of the libraries have not had any financial allocation for renewing subscriptions to indexing and abstracting journals for more than 10 years. Others have had to decide between subscribing to actual journals or indexing and abstracting journals since the allocation covers both journals and indexing services. Faced with such decisions, the libraries commonly opt to subscribe to actual journals and ignore indexing and abstracting journals. Only three libraries have a definite allocation that enables them to subscribe to key indexing and abstracting journals covering core areas of their courses and only six of the libraries subscribe to online databases. A few of the libraries which do not subscribe to online databases access donated CD-ROM databases, while those that have Internet connectivity are able to search databases on the Internet.

A review of the research on how social scientists access literature in their disciplines revealed that academics predominantly use non-systematic methods (Baxter 1990: 419). The methods used by library users to access and identify information from periodicals in university libraries in Kenya pose a number of limitations. The lecturers depend on browsing as the main source of their references. Given the heavy teaching load, most end-up not having enough time to physically browse through issues that may include articles in areas of interest to their teaching and research programs. Students too, do not have enough time to browse through periodical issues that may contain relevant information due to congested programmes and/or timetables. It is difficult for library users to visit other university libraries which hold periodicals in their areas of interest, and browsing through periodicals due to lack of time and transport among other reasons. It is in rare cases that articles cited in printed indexes and considered to be relevant by library users are found in periodicals in these libraries. University libraries in Kenya do not allow students from other universities to use their libraries due to limited seating space, over dependence and other institutional policies. The users are therefore not able to visit and browse. In some instances, although there has been improvement over recent years, the Internet turns out to be unreliable due to blackouts, at times it is not working and response time is slow at certain times of the day. These methods of

access do not work well for users who require instant searches to be conducted for them to meet programme deadlines as was previously noticed in this study.

A number of library users obtain information from other students who have previously consulted the same periodicals to locate references and articles from periodicals. Of concern was the unconsciousness of some of the users about the existence of periodicals in the library and the library's assistance in locating articles for users. The libraries' assistance is in the form of providing instruction in the use of printed indexes; assistance while searching for periodical literature on the Internet; conducting searches using indexing and abstracting journals; providing current awareness lists and tables of contents to library users particularly lecturers whenever new issues are received; indexing by subject (in-house) in anticipation of search requests; actual assistance by library staff during use and through requests given to libraries; and photocopying and posting on notice boards titles of articles and tables of contents of periodical issues. It was noted that there is a need for university libraries to assist their users to access information contained in periodicals held in other university libraries through: obtaining periodicals in known subject areas through interlibrary loans and making them available to their library users; borrowing periodicals known to have particular information from other libraries through interlibrary loan-based requests for library users; and introducing library users to other libraries to enable them to visit and consult periodicals in those libraries known to have periodicals in particular subject areas. The over reliance on other libraries is however being discouraged as universities in Kenya have to ensure that they develop resources that meet informational requirements of their own clientele as a requirement for accreditation (Commission for Higher Education 2008).

Ideally, users prefer to quickly get periodical articles that are relevant to their needs. Browsing as a method of identification is not only cumbersome but also time-consuming particularly if one has to physically browse through several volumes of periodicals to get what may be useful. Also, the user is only able to browse through what is available on the shelves. What if the issues containing relevant articles are not on the shelves at the time of browsing? Users of periodicals have to contend with missing issues and gaps in

library holdings. For students to have to depend entirely on reading lists given by lectures for their research and study is not adequate. For instance, what happens in cases where lecturers do not give lists, as is the case sometimes. Also, lecturers too depend on browsing for identification of relevant resources which is unfortunate since most of them hardly have enough time to visit libraries for browsing.

With developments in technology, library patrons in university libraries are provided with the same kind of information as achieved with Google searching. In fact, according to Bell (2006:105) the searching simulates Google and then goes beyond. Technology allows libraries to emulate the “do not make me think” environment provided by Google through federated searching. With this kind of searching, users access articles’ indexes, the library’s online catalogue and locally developed or Web databases all at the same time. Beyond this, technology gives an opportunity to libraries and library users for faceted browsing or search clustering that allows the user to narrow down their search results contextually.

It is evident from search results that effective information retrieval depends largely on user’s search skills, their knowledge of the information retrieval systems, and the search mechanism they employ (Bandyopadhyay 2010:34). It is therefore necessary for libraries to train the end users who search databases and other digital resources remotely and without any intermediaries. Even those who search manual indexes need to be trained for effective retrieval of printed information not available in the databases. Ignorance of what indexes are and what role they are expected to play in assisting users to identify relevant periodical articles has been observed by this study as contributing to non-use of periodical literature.

Expression of an information need, communication of that need to the system, implicit inter-human communication, indexing consistency, reliability of retrieved items and the need of the searcher for five distinct knowledge types are some of the difficulties in information retrieval (Boyce 2004:563). Humans are good at recognizing relevance but not describing it. Browsing with the help of computers, ie meta-browsing enables

searchers to overcome these difficulties. Computers make it possible for browsing of information about the document domain, contents, location and relations to their documents, rather than the document themselves. A key term is chosen from an alphabetical list, its preferred term is substituted and a window opened around this preferred term in the domain. The related terms are added to this window together with other aspects and linked to indexed documents to give the orientation needed by the user.

A number of university libraries in Kenya have cited lack of funds and Internet connectivity as the main reasons for non-subscription to online databases and for not indexing periodicals held in their collections. To meet the expectations of university library users, this position needs to be reversed. Universities should invest in periodical subscriptions both print and electronic, and enhance their ICT capabilities as a step in facilitating research and scholarship. They should ensure that the contents of these periodicals are exposed through provision of effective locating tools to meet expectations of library users.

5.3.2 Expectations of periodical literature users

The increased emphasis on customer care witnessed in the 1980s and 1990s has impacted on service delivery in university libraries around the world and as a result the need for libraries to understand what library customers expect in terms of service quality is now necessary for good management (Calvert 2001:733). The belief that librarians already know what customers want, need and expect is one reason that has led to the librarians' slowness in investigating service quality (Hernon *et al* 1999:13). Studies on student expectations have shown that services which librarians value highly may not be valued highly by students and it is important that librarians address user expectations appropriately (Harwood & Bydder 1998:168). Patrons have low expectations of what librarians have to offer, perhaps limited to a belief that they know where and how to get the information they need without the librarian's assistance (Durrance1992:283).

Library patrons have expectations about the service they will receive from the library and it is widely accepted that the key to good quality service lies in providing performance that meets or exceeds customer expectations of the service. This places the onus on library managers to know the expectations of their customers. A fuller knowledge of customer expectations will thus provide the management with a fuller understating of the complex nature of providing quality service (Calvert 2001:733).

Broadly speaking, university students have a wide variety of expectations when they visit libraries. According to Sweeney (2005:168) the majority of students entering university education today have grown up in a multitasking environment complete with immediate feedback and high expectations. Their expectations have changed from “as soon as possible to simply now.” Many studies have acknowledged the fact that user expectations have been climbing, with patrons demanding round-the-clock service and instantaneous answers (Knibble-Haanstra 2008:23). The demand resulting from new technology is to maintain responsiveness to the user community and regularly conduct environmental scans of the current developments in library science in order to provide relevant and useful information to patrons. Presently, the object and motivation of the librarian’s work is focused on meeting users’ needs and expectations (Knibble-Haanstra 2008:24).

It is increasingly becoming clear that academic library users have similar expectations in regard to service. Apart from staff attitudes and the library environment, the service that helps users find and use the library materials efficiently were found to be the most common dimensions with similar expectations in a study conducted in the USA, New Zealand, Singapore and the Republic of China (Calvert 2001:750). The current study found that users expect the following from libraries with regard to identifying and using the periodical literature:

a Provision of citations to articles and actual information contained in periodicals within reasonable time

Library users expect to be given cited articles considered relevant to their study and research within a reasonable time frame. However, this study has shown that the majority of library users in university libraries in Kenya do not get all or most of the articles or periodical issues of references cited in available indexes, abstracts and electronic resources such as CD-ROMs and bibliographic databases. Some of the users observed became excited when they got relevant citations from such indexes such as the *Social Science Citation Index* and other existing printed indexes, only to find that none of the cited articles is available in the library.

b Provision of literature alert service

Library users expect to be informed about information contained in newly acquired periodicals that may be relevant to their academic and research needs. This would keep them informed and updated with developments in their area of interest. Some of these articles are likely to earn users better credit in their assignments, improve academic performance and quality of research and overall professional practice for respective categories of users. A total of 262 (82.9%) users expressed the need for alert services. The price libraries pay for not having selected services can be illustrated using what one respondent remarked: “If the library does not have a single article in my topic of research, what can then bring me to the library?’’ It was also noted that most of the users are not aware of the existence of periodicals that have articles that could assist them in their study and research. The majority did not even know that the library subscribed to core periodicals with relevant articles that could assist them in study and research programmes as no effort is made to alert them by their libraries.

Library users require the alert service to be able to know which acquired periodicals have articles relevant to their research needs as well as to keep them informed and up-to-date with developments in their area of interest. It is therefore the duty of the library to provide information on relevant periodical articles whenever they are available. Sometimes users are unable to find a given item ultimately assuming the library does

not stock such an item. It is important for students and staff to know about new and emerging developments in their area of specialization to remain informed and competitive. Respondents (users and librarians alike) emphasized the need for libraries to disseminate periodical information to all their patrons.

At the moment, the majority of university libraries in Kenya do not provide alert services to their users. Where the service is provided, it has been described by respondents to be ineffective. The alert service is necessary for assisting busy library users to avoid remaining in the dark about availability of relevant articles as they access the library. The issuance of the alert messages to patrons is likely to motivate them to visit the library at an appropriate time to consult the information. To be able to provide an effective alert service, libraries have to maintain user profiles. The study has shown that only 17.4% of the university libraries in Kenya maintain user profiles at the moment and that those which maintain the profiles do not keep adequate information about their users.

University libraries that maintain user profiles, use these to alert users whose profiles and requirements are known, about relevant information contained in incoming periodicals to enhance usage of the periodicals. Respondents also suggested that the profile details should contain the following data elements required to service a typical request for periodical information by university users: username; department/course/address/occupation; category (student/lecturer/profession; level (PhD, Master's, undergraduate); topic/area of specialisation; date of request; and date of completion/deadline.

c *Literature searches*

University library users expect their libraries to assist them with literature identification by conducting actual searches for them on request. This service is expected to enhance usage of periodicals containing articles relevant to their requirements if held by the libraries or by other university libraries within the country. Slightly over half (ie 51.6%) of the library users indicated that they give their librarians details of their literature

requirements or make search requests. The majority of users currently not using the service expressed the need for the establishment of such a service in libraries. In situations where users are aware of the existence of the relevant articles in periodicals held by other libraries, they are assisted to get these through interlibrary loan services. In some cases, the users are assisted to locate journals in other libraries using union lists of periodicals; periodical lists and indexes from individual libraries and institutions that compile them.

It was noted during the interviews that librarians in most university libraries in Kenya do not market assisted literature search services to the users for fear of being overwhelmed with requests. Most libraries in Kenya cannot adequately provide an effective periodical literature search service, the majority of them operate without good indexing services necessary to facilitate search requirements. Some librarians indicated that they would be overwhelmed if assisted search services were advertised since they do not have adequate indexes to assist in locating relevant periodical information.

Maintaining an effective, efficient and free interlibrary loan system is an important service that librarians are expected to provide to their users (Atlas 2005:317). In this electronic era, library users expect to be assisted to find relevant information whether in a book format or journal article, database or Web document. Librarians are expected to also instruct their patrons on how to conduct literature searches or do electronic searches for or with patrons. Today, many databases provide an option known as “ask a librarian”. Librarians must, therefore, teach users how to access such a feature from wherever they are (Atlas 2005:318).

d *Assistance in identification of relevant information contained in periodicals held in other university libraries in Kenya*

Users of university libraries in Kenya expect their libraries to assist them to identify relevant information contained in periodicals held in other university libraries in Kenya. However, results of this study have shown that the assistance given is limited to interlibrary loan arrangement and referrals by lecturers and librarians to libraries likely to

be holding periodicals in the users' fields of study. Such assistance is based on the assumption that the library users are likely to get some relevant information from the periodicals held by the respective libraries. Identification of articles in periodicals held in other libraries is not at the moment possible due to non-indexing of periodicals by most university libraries in Kenya. The union list of periodicals held in libraries in Kenya was last updated more than 16 years ago and can thus not accurately guide library users to university libraries that might have relevant periodicals given that most of the universities in Kenya were established within the last fifteen 15 years and their holdings are therefore not covered in the union list.

e *Assistance in narrowing down relevant periodical information to the users' satisfaction*

Contemporary library users require information that is specific to their needs, a situation that requires information providers who have skills of narrowing down the search to articles relevant to users' needs (Mosley 2007:166). Users commonly phrase their queries in the context of the need of their end product or the problem at hand. Those librarians serving them need to understand the actual aspects and be able to apply a basic form of the information or reference interview to make appropriate referral decisions. An understanding of the academic disciplines and the inter-disciplinary research topics therefore becomes an important skill for better referral services.

Sometimes the information retrieved during a search is substantial and there is no certainty that the relevant information has been identified. Academic library users described both qualitative and quantitative criteria, which lead them to make rational choices determining when "enough" information satisfies their need. The situational context of both the participants for specific information needed and their role in the academic society was found to affect every stage of their search from the selection of the first resource, to ongoing search strategies, to decisions on how much information is enough (Prabha 2007:74).

This study found that library users sometimes find many articles on a topic during their search for information, some of which do not relate directly to the aspects of interest. The users indicated that they would like to have librarians narrow down the number of articles in order to provide only the most relevant ones. Users also indicated that they have adopted the following methods and procedures to narrow down the number of articles:

i browsing through given references and articles and then selecting the ones that specifically fitted their areas of interest and
ii reading through summaries of articles (when provided).

As can be seen, the process is not only cumbersome, but time-consuming. The study found that these methods are not effective in assisting the user to identify relevant articles quickly. It is necessary for library users to be assisted in narrowing down the search to references that meet their specific requirements. Information sought by users is normally for a specific purpose and therefore the information that is likely to have utility must contain the aspects that relate to the purpose for which the user is seeking the information.

It is possible during the search for the libraries to give the user irrelevant information, particularly when the aspect sought is not captured well in the articles retrieved during the search on the sought subject or concept. In such cases the librarian should revisit the search strategy and the sources of information in consultation with the user. The aim should be to as much as possible provide what meets the user's specific needs and what the user considers relevant and of value.

Generally, authors present their thought from a variety of perspectives including their own (Blackemore 2009:89). One can form an own view and also change it when exposed to other experiences (Burton & Mccully 2010:142). A study can be carried out from a social, political, historical and several other points-of-view. Indexers fail the researchers when they provide aboutness rather than the aspect or point of view

(Weinberg 1988:4). Users have their view of what the document should contain for it to be relevant.

The subject knowledge view of a document, which may be termed the epistemological view, has been described as the most fundamental perspective of relevance (Birger 2010:217). According to Birger, the concept is influenced by overall approaches to information, such as the cognitive view and domain analytical view. Users judge relevance in various dimensions but retrieval systems only support matching of queries to documents or document representations (Cosijn & Bothma 2006:33). Systems should support users in order for them to make relevant judgments on the level of cognitive relevance, situational relevance and socio-cognitive relevance. This position can be achieved when users are assisted to make multidimensional relevance judgments.

Library users have expressed the need to be assisted by their libraries to be able to narrow searches down to the articles and/or information they need in terms of specificity (ie points-of-view, aspects and methodologies used in studies). Observations made during the study found this requirement to be characteristic of most requests made by researchers. As more university libraries in Kenya develop fourth year, Master's, and PhD programmes, and as more authors enter the publishing scene, the need to specify points-of-view, research methodologies, approaches and others will become more important, that is, if the information is to have utility for the users in these categories. Specifying points-of-view, methodologies, approaches and other concepts should therefore be introduced as key aspects of indexing, if it is not already in place. This will ensure that information sought by this category of users either at present or in future will be retrieved if these aspects are adequately catered for. Just as libraries often anticipate demand while acquiring and processing books they should also anticipate users' needs when indexing periodicals to expose their contents to the current and future users. The ability to combine concepts should be demonstrated to library users during orientation and during special user instruction programmes mounted by university libraries as part of user education.

g Quality service delivery

The changing information environment and changing expectations and demands of library users are forcing libraries to reassess their role in the digital age (Marcum 2003:636). Amid this change, there is a fundamental constant, which is the need for access to high quality research materials. For instance, due to a growing encouragement for interaction between librarians and patrons, librarians have to deal with user's expectations for instant information and also have to handle search requests that are varied in scope (Placzek 2001:47). With the advent of information handling technologies, university library users in Kenya just like their counterparts in the developed countries where libraries are well developed, expect their libraries to take advantage of technological developments in the country to improve on the provision of information. This study has found that the majority of the library users are not happy with the sort of services they are accorded by their libraries, particularly with regard to the usage of periodicals. Most have indicated that they are left on their own and without effective tools to enable them to retrieve the information they require from periodicals. Their expectation is that they should get information contained in periodicals within the shortest time possible. However, this is not possible as libraries have not done much to expose the subject content of articles contained in periodicals held in libraries. The absence of information on which relevant articles are contained in the periodicals held in other libraries within the country, also makes it difficult for users to use the articles, as they are not aware of their existence.

Some of the concerns that were considered by students as factors affecting the quality of service as far as the provision of information contained in periodicals is concerned include: the users' lack of awareness of services available in the library; lack of diversification in periodical titles held in each library; and lack of information on contents of periodicals held by other libraries. The users are simply referred to those libraries. Librarians also, do not offer much assistance to the users as they just refer them to the periodical stacks.

A typical quality service observation was made during this study using periodical information from the University of South Africa (Unisa) Library. The present researcher requested for searches to be conducted on given topics by his subject librarian at the Unisa library through e-mail. Searches were conducted by the subject librarian and e-mailed to the user the same day. Articles considered relevant were then selected and information posted to Unisa for the supply of the articles. Within a week, the photocopies were sent to the researcher. The author occasionally did searches in the databases hosted by Unisa's Library downloaded articles for purposes of conducting the current study. The ability to make instant searches and be able to select what was relevant was a typical example of good service on the part of Unisa. This further demonstrated that once indexing structures are in place, particularly for the handling of periodical information, the role of information providers will become easier. Indexing was taken up by libraries in South Africa with the realisation that such tools make it possible to get information conveniently and within a reasonable time frame.

5.4 PRACTICES OF PERIODICAL INDEXING IN UNIVERSITY LIBRARIES IN KENYA

In information retrieval, stored documents and records are normally identified by sets of terms or keywords that are collectively used to represent the document content. The terms are assigned to documents during the indexing process. Some university libraries access international databases and search periodical literature through the Internet. Such libraries are able to use search terms and keywords assigned by database indexers and have the advantage of conducting searches under these terms and even narrow the search down by adding more keywords, document type, year and author, until they attain the specificity of their desire. However, the numbers of databases subscribed to by most libraries is still small, as most libraries cannot meet subscription costs for some of the databases. Some of the libraries in Kenya are currently subscribing to and accessing electronic databases through Privatisation in Education Research Initiative (PERI).

There exists therefore the need for libraries to change their policies to ensure that all categories of periodicals held in their collections are indexed. This study found that

some of the libraries have started indexing their periodicals in-house to ensure that the subject content of periodicals is brought to the attention of the users. This is expected to facilitate maximum identification, access and usage of relevant information contained in the periodicals. It was found that more than half of the libraries, ie 18 (66.6%) do not index their periodicals. These libraries rely on commercially produced indexes to provide the users with access to information contained in periodicals. Some libraries have indicated that they have plans to start indexing periodicals held in their collections. Journals are the only category of periodicals that are indexed by all libraries that index their periodicals. Again, some of the libraries index selected issues of journals that are within the scope of their indexing policy. Newspapers and magazines are indexed by about half of the libraries that index periodicals. For some issues, only the information relevant to courses taught by the parent university is indexed.

Some university libraries in Kenya see in-house indexing as unnecessary mainly for two reasons: firstly, most of what they receive largely through donations is not scholarly and therefore does not warrant indexing and secondly, alternative indexes are available in the market and there is therefore no need for in-house indexing. They have therefore not developed any local indexes to supplement what they acquire from commercial publishers. The aforementioned reasons explaining why some libraries do not index periodicals are not convincing. The argument that periodicals received do not warrant indexing, as they are not scholarly does not explain why the libraries keep them on their shelves in the first place. The argument goes against the common belief that any information resource that is housed in the library must have some anticipated utility and therefore its contents should be exposed through indexing. The reasons cited by libraries for not indexing periodicals already existing in their collections, do not portray the seriousness libraries as information centres are expected to be in, when processing sources of information that they are expected to provide to their clients. None of the reasons seem to address the cost and efforts taken to acquire these periodicals in the first place; the role of the university library as a centre for information provision to the university community; the value of periodicals in communicating academic and research information; and the need to enhance access to information contained in the periodicals.

Of concern for most libraries is the priority rating accorded to indexing as a task in the libraries. For those that index, this is only done whenever there is some time to spare. None of the libraries are yet to consider indexing of periodicals as being as important as the classification of books, even for edited works that carry a number of articles within a single volume.

The factors raised for non-indexing of periodicals such as a lack of time, shortage of staff, lack of expertise and lack of computer facilities pose great challenges to in-house indexing in university libraries in Kenya. Working on the assumption that commercially produced indexes – such as *Accountants' index, Readers guide to periodical literature,* etc. – are sufficient as search tools and totally ignoring to develop own indexes to periodical literature which can be used alongside the acquired indexes, is in the opinion of the present researcher not enough for those entrusted with processing periodical literature. This study has shown, using evidence in the literature reviewed, that although there has been marked development of printed indexes, some of these are of poor quality, while others are too expensive for some libraries. The argument can only suffice if it is ensured that the indexes available in the market are always of good quality and affordable, a position that this study has shown to be difficult to achieve, as the majority of the university libraries in Kenya are not subscribing to any quality indexing periodical due to shortage of funds. The study has indicated that with the present levels of funding for the renewal of periodical subscriptions, university libraries in Kenya prefer to subscribe to additional journals rather than subscribe to abstracting and indexing services. For instance, the University of Nairobi library cancelled its subscription to *Chemical Abstracts* costing Kenya Shillings one million – an equivalent of US $128,205 – in order to renew subscriptions to a number of titles of core journals.

Results have also shown that periodical indexing in university libraries in Kenya is underdeveloped. This poor state of development has partly been attributed to: firstly, the failure by the library administrators in articulating to the university authorities the need and importance of the indexing of periodicals in facilitating the identification of and access to periodicals held by the library; and secondly, lack of initiative within the ranks

of the library staff to index periodicals out of a personal drive. The lack of self-efficacious persons in university libraries in Kenya, such as those who existed between the eighteenth and twentieth centuries in the developed countries, is evident. According to the literature, these persons saw the need for a bibliographic tool that would free them from the often-fruitless activity of searching for material on subjects relevant to their interest. They compiled indexes, although some were without adequate subject access to facilitate the communication of scientific ideas. These indexes have since the 1970s continued to serve as key bibliographic retrieval tools in libraries and information centres in developed countries (Burger 1979:157).

With the advent of computer technology and its application to information handling, university libraries and information centres, particularly in the developed countries are using computers to process, store and retrieve information contained in periodicals. This has resulted in more access and usage of periodical information. Evidence of such developments is witnessed specifically in:

- the development of several online databases that has resulted in most indexes being available in electronic formats;
- availability of periodical indexes in electronic databases on the Internet which has made massive printed communications obsolete;
- databases, some of which have shifted the burden of indexing to users, most of whom are however, woefully ignorant of the proper use of the strategies and therefore getting only meagre results if left to their own devices, thus necessitating the mounting of literacy programs by libraries; and
- development of automated indexing that has seen the availability of computer programs that can:
    - i make intelligent summaries of documents, typed or scanned into them or taken from the Internet;
    - ii understand the aboutness of documents and deduce the most important information on the fly;
    - iii are able to read the whole text instantaneously and are more consistent than the human indexers; and

iv are unbiased and have traits best suited for text retrieval, including character based analysis and speed.

Despite these developments, the present position is that the indexing performed exclusively by a computer that will analyse a text and produce index headings that can be modified by subheadings for related topics scattered in the text, augmented by index terms for topics only implied but not expressly stated in the text, and which can provide cross references for conceptually related topics, is not available.

The literature reviewed in Chapter 2 in this study has shown that considerable prior knowledge of the literature, judgment as to what depth to index it, reading skills, ability to deal with non-verbal data, the analysis and evaluation of texts, the creation of abstracts, knowledge about inter-textual links and the cataloguing and classification skills for database creation is required (Ward 1996:217). At present it is unlikely that automatic indexers will replace human indexers but as more primary texts become available in electronic form, automatic indexers are becoming useful productivity tools for dealing with large quantities of data. Electronic indexers index resources from very narrow domains. Indexing requires judgment, analysis, knowledge, sensitivity and commitment. There are some intellectual operations involved which computers are not capable of carrying out effectively. The writers of computer programs argue that computers cannot supplant professional indexers (Jones 1992:8). More intellectual abilities are being put to good use by relieving human indexers of tedious and repeating tasks that are performed better and quicker by technology. Thus, we see development of computer-assisted rather than human and machine-dedicated indexing. This study has shown that university libraries in Kenya are starting to take advantage of the available technology to index periodicals in order to facilitate effective storage and retrieval of periodical information.

With regard to the theoretical development of indexing in Kenya, no evidence was noticed during the study. Concern for indexing is just developing among the university libraries in Kenya and the libraries that index their periodicals have adopted a simplistic

approach which regards subjects as absolute objective entities that can be derived as direct linguistic abstractions of documents or summed up like mathematical figures using statistical indexing methods (Albrechtsen 1993:219). However, it is viewed that this position is likely to change soon as library and information science schools in Kenya continue to enrich and address the various aspects of indexing covered in their curricular to reflect important theoretical and practical developments that have occurred in periodical indexing. The existing literature has revealed an increasing concern for the concept of aboutness as a factor in the retrieval and on the usage of periodicals that should be keenly addressed during the indexing process by university libraries. Albrechtsen (1993) stipulated a model of conceptions of subject analysis that covers three different conceptions or viewpoints of subject analysis and indexing namely: simplistic; content oriented; and requirements oriented. The university libraries in Kenya index periodicals based mainly on aboutness and concept analysis.

University libraries need to go beyond the textual and sometimes grammatical surface structure within which the simplistic approach operates. The content-oriented approach that additionally involves an interpretation of the document contents goes beyond the simplistic level. During the subject analysis of document contents, topics or subjects that are not explicitly stated in the textual surface structure of a document are readily perceived by the human indexer. The explicit and the implicit subject information in the text form the foundation of subject analysis. Franken & Grandel (1990:653) described the content-oriented approach as the most common approach to subject indexing. As stated in (Hjorland 1992), a pure content-oriented approach results in trivial descriptors which cannot be applied to search more profound aspects like those implied but not stated in the document. This argument had also been stated by Weinberg (1988) in a critique of the abruptness approach to indexing. Blair (1990) challenged researchers in automatic indexing to consider their methodological weakness. Indexing fails the researcher because indexes provide the abruptness rather than the “aspect”, that is the point of view or innovation of a document which cannot be perceived by interpreting a document as an isolated source of knowledge (Weinberg 1988:3). It is the user’s search for knowledge in the information retrieval systems or indexes that should determine the

method of indexing. In request-oriented indexing, a document is analysed with the purpose of predicting its potentials for serving a particular group of users. Soergel (1985) and Hjorland (1992:178) describe the requirements-oriented conception as a common denominator for indexing. Libraries that adopt a mixture of both concept and user requirements approach to indexing get the best result during retrieval. Documents are created for communicating knowledge and the subject data should be tailored to function as instruments for mediating and rendering this knowledge visible to any possible interested persons.

5.5 QUALITY OF INDEXING AND RETRIEVAL OF PERIODICAL LITERATURE IN UNIVERSITY LIBRARIES IN KENYA

It has been observed that lately, many students use the Web to find information relevant for their assignments rather than using the periodical indexes offered via the Web. Although this practice is not discouraged, the whole issue revolves around the quality of information that the students find by themselves without professional guidance from librarians (Tenopir & Ennis 2002:270). Unless identification of relevant information contained in periodicals is facilitated, the usage of these scholarly information resources will remain low.

Davis and Cohen (2001:309) found a significant decrease in the frequency in the citing of scholarly resources in microeconomics term papers from 1996 to 1999. Scholarly materials are cited less often while non-scholarly materials such as newspaper articles and Web documents are cited more often. The prevalence of newspaper articles can be attributed to the widespread availability of full newspaper text through university libraries. The Web may be accessed from home or on campus. Davis and Cohen (2001) found that approximately half of the Uniform Resource Locators (URL) cited in student papers led to the correct websites. An update on this research found that the numbers of citations on websites of newspaper articles in student term papers continued to increase, but papers submitted electronically had a higher percentage of overall URLs.

The usage of periodicals is extremely low particularly in regard to journals and back issues of newspapers in university libraries in Kenya which do not index their periodicals. Most library users tend to read current newspapers and magazines as the users are certain that the papers contain new information. The usage of other types of periodicals is much lower as the users are not sure whether the said periodicals could be containing information relevant to their requirements. Also, it takes too long to get such information since they rely on browsing as the main method of determining periodical issues containing the sought information. A large percentage of students (90.2%) indicated they had never used indexes. Ignorance of the role that indexes play in information retrieval was observed to be directly affecting the retrieval of information contained in periodicals held in libraries as was seen at Lower Kabete Library which was used as a site for observations. Without the use of indexes, communication between the periodical information and the potential user is either poor or lacking altogether. This has been supported in this study by the usage of journals, current newspapers and magazines that was observed to go up when indexing commenced at Lower Kabete Library. More and more research students looking for this information were able to have the information identified and easily retrieved, with the commencement of the indexing project initiated at lower Kabete Library of the University of Nairobi by the present researcher.

According to Callicott and Vaughn (2005:71), Google scholar, while a substantive supplementary research tool, does not provide the same quality terms of relevance for many research topics when compared to subscription databases and library catalogues. Libraries considering subscribing to databases have to pay careful attention to the depth and quality of indexing in making their decisions (DeLong & Su 2007:99). Basically, there are qualities or characteristics built in the indexing systems which influence retrieval of periodical information. These aspects include, among others the following:

5.5.1 Overall approach to indexing

University libraries in Kenya, which index their periodicals, use a variety of approaches to indexing. Some employ a request-oriented approach, others employ an entity-

oriented approach, while still others employ both request-oriented approaches and entity-oriented approaches in varying proportions. The request or user-oriented approach which makes a detailed study and logical analysis of user requirements, was found to make it possible to build an indexing language that provided a communication device between the indexer and the user. In this case, an indexer who also services search requests from users in a given area, is better placed to ensure that the terminologies which they use are incorporated in the index language. This ensures that the information is readily identified and retrieved during searching thus increasing retrieval performance for indexed periodicals.

Among the three indexing conception-based approaches, the content-oriented approach and the document-oriented approach have been found to be more effective than the domain-oriented approach (Eunkyung *et al* 2010:688). Thus the objective contents and the author's intentions were more desirable for subject-term assignment via text categorisation than the possible needs of users. The incorporation of human indexers' indexing approaches or conception in conjunction with semantic sources has a positive impact on the effectiveness of automatic subject term assignment. The entity-oriented indexing is crucial to research as well, particularly where new concepts are concerned or where there is marked specialisation. Observations and analysis of search requests made during this study shows that the majority of the university researchers tend to research on what is new. The entity approach, in which the indexer determines all the concepts considered indexable, including new ones, ensures that the concepts are captured and entered into the database. Libraries are expected to acquire and process periodicals in anticipation of demand. Thus the entity approach maximises as far as possible the probability that a descriptor needed in searching is available in the index language and is used during indexing. The indexing method used affects the availability of just the right descriptors needed for searching and the correctness of indexing.

5.5.2 Exhaustivity of indexing

Exhaustivity in indexing, ie the extent to which concepts are covered by the descriptors assigned to the entity may affect retrieval performance. Viewpoints or facets are not

provided in the indexes existing in libraries in Kenya. It is therefore not possible to specify viewpoints or certain facets during searches. Library searches made during this study for researchers at Lower Kabete Library where observations were conducted, showed evidence of a need for these aspects. There was for instance, lack of provision for research methods such as survey, panel, case, field and empirical studies. These aspects are commonly sought by researchers and have been found by this study to be missing in some indexes. Searchers do not have the opportunity to achieve higher discrimination when viewpoints useful for retrieval are not represented in the index language and thus available for retrieval. Adding certain viewpoints reduced recall in some indexes – mainly printed indexes – and where pre-coordination is preferred to post-coordination thus making searches more specific at the expense of using concepts that would map out all relevant although broad aspects of the articles or periodical information.

The importance of exhaustivity indexing has been found to also affect retrieval. Importance exhaustivity addresses the question: what is the important threshold for the assignment of descriptors as prescribed in the indexing rules? Which of the concepts associated with this entity are important enough to warrant indexing? Will the descriptor find only documents that are centrally important or will it also find documents that just touch on the descriptor? A document is judged as relevant if it concentrates on a subject and at least mentions a given aspect. This was evident in searches made for students during observation. The entity being indexed is relevant in varying degrees to a number of concepts. The two main components of exhaustivity (that is, viewpoint and importance) have to be fulfilled for the retrieval of information that is relevant, pertinent and of utility to the users.

Some of the entries used in the existing indexes found in university libraries in Kenya are not exhaustive and are generally of poor quality following a lack of proper concept analysis. Not much thought is given to the entries, subject content and user requirements during indexing with some indexers just perusing through issues. Consequently they do not provide predicable search terms that could lead to retrieval of

desired information or articles. It is considered important for all facets, including the ideological orientation of the author of the article to be included in the index language, to offer the required indexing completeness particularly for researchers whose requirements go beyond what is already known, and a specific request to be given that is added to knowledge or a particular aspect. In some of the indexes evaluated during document study, indexing completeness was found to be low, as some of the entries showed lack of awareness with intricacies of subject analysis and therefore did not recognise and incorporate some of the key search terms.

5.5.3 Specificity of indexing

Specificity of indexing, that is, the generic level at which the concepts assigned to the entity are expressed, has been shown to influence retrieval performance (Soergel 1994:593). Thus, while some of the indexing agencies seem to prefer to have a policy for fewer concepts, pre-combined to required specificity, others prefer co-ordination where specific terms are combined at the point of searching and assign as many terms as considered useful for retrieval, and narrowing down to required degree of relevance. This study found that due to indexing errors some of the terms used in indexes were found to fall short of the expected standards of specificity. Some indexers were unable to differentiate between specific descriptors or information used to determine the most specific descriptors. The way documents are indexed plays an important role in retrieval. Infrequently occurring terms were found in a study to provide lower outcomes, than where a higher percentage of frequently occurring terms exist (Wolfram & Zhang 2008:3).

The effects of indexing depend on the specificity of the search. Specific searches are expected to take advantage of specific descriptors to increase discrimination. But for broad searches specific indexing does not help. The effects of specific indexing on specific searches depend on the correctness of indexing. Specific descriptors make the searches more vulnerable to indexing errors. In a printed index used in this study, *The Ngarua Index* (1998:248), indexers were unable to determine the proper specific descriptors and resorted to assigning broader descriptors and in some cases phrases.

They for instance, assigned a phrase such as "farmers oppose mills plans" as a subject. Specific descriptors then became less reliable as possible search terms and this was seen to affect retrieval tremendously.

The effect of specific indexing on broad searches depended on the capabilities of individual indexes. Indexes with a well-developed hierarchy performed well during searches made, using the *Social Science Citation Index*, so long as the inclusive search is used. But where an inclusive search is not provided the searchers looking for a broader descriptor have to remember to include in the query formulation all the narrow descriptors generated from the hierarchy. Due to poor retrieval software, card catalogues and printed indexes in most university libraries in Kenya, it has become too laborious and a drawback to specificity under these circumstances. The study has shown that for indexes that did not have a good hierarchy, things were even worse. Under these circumstances, the searcher is forced to think of all possible narrow descriptors, in some cases consulting reference tools. Since the searcher may be unable to come up with a complete list of narrow descriptors, recall was found to suffer. This scenario was found to prevail when consulting most printed indexes used in university libraries in Kenya, making them less useful in retrieval of data on specific aspects.

5.5.4 Indexing correctness

The authors of periodical articles could be relied upon for providing search terms required for retrieving their articles in both print and electronic databases. However, according to Ruppel's third rule, expertise in a particular field does not translate into indexing or search expertise in that field (Ruppel 2006:57). Analysis of terms used in existing indexing tools consulted during the study revealed that although indexing correctness or absence of indexing errors was the overriding the importance for retrieval performance, it is not being adequately addressed by university libraries in Kenya. Two types of errors namely, errors of omission and errors of commission were found to be prevalent, making it difficult for relevant information to be retrieved. It was commonly found that some of the descriptors that should have been assigned were omitted, while

descriptors that should not have been used, were found to have been used. A number of descriptors that should have been expected to be used for each entity, were in some cases not indexed in the existing in-house indexes. This lack of completeness of indexing meant retrieval failure for searches made using the terms. This effectively leads to low recall. Some terms in the printed indexes are cited by erroneous descriptors assigned to them by the indexers. This lack of purity of indexing meant presence of errors of commission in the indexes, which makes it difficult for discrimination or for rejection of entities that are not relevant during searches. These errors suggest the need for well-trained indexers with sound familiarity in the subject matter and the ability to predict the needs of users and correctly incorporate these in the indexes to facilitate effective retrieval.

5.5.5 Indexing consistency

Successful retrieval of stored information depends to a significant extent on consistency and therefore predictable representation of subject matter in the indexes or search tools used by information providers. Indexers are in most cases confronted with no consistent or clear explication of what they are looking for in a document. The difficulties with “abruptness” and inconsistencies experienced during indexing, results in poor quality indexing, which in turn hinders the quality of information retrieval.

The phenomenon of inconsistency was found to be common among indexers indexing the same article in two indexes namely: *Ngarua Periodicals Index* and *The Weekly Review Index* consulted for this study. Consistency was found in the present study to be necessary and a crucial factor at all stages in the indexing process and in its absence, articles which were similar, ended up being indexed differently. Their similarity is thus not reflected in the set of indexing terms assigned to the articles. This introduced uncertainty in the information retrieval system. Concern for consistency in indexing must be given due consideration during indexing as it affects predictability, and makes some of the existing indexes less useful in the retrieval of relevant articles and/or information from periodicals.

5.5.6 Indexing policies in university libraries in Kenya

Libraries that index periodicals have set up indexing policies which serve as guidelines for decisions to be taken during the indexing process. These policies have an impact on the retrieval performance according to Salton (1997:23). Failures in the indexing policy immediately lead to retrieval failure. The main indexing policies which university libraries in Kenya have put in place include: which periodicals to index; what type of information to include from each periodical; term selection; and the depth of indexing. The policy on which periodicals to index has a direct bearing on the overall information that can be retrieved using the index. Some libraries index all periodicals held in their collection while others index only certain categories of periodicals, such as journals and newspapers etc; others index current periodical issues only; some index issues of popular periodical titles only, while others index periodicals covering certain geographical or subject areas only. Thus retrieval capability of the index is limited to the periodicals indexed. The index is therefore of no assistance in the retrieval of information contained in the category of periodicals that are not indexed under the policy. The effect of exclusion by policy came out clearly when some of the commercial indexes in university libraries could not assist in locating relevant information published in many periodicals held in the libraries since most of these were not covered by the indexes due to their varying indexing policies.

A policy on what type of information to include from each periodical ensures that only indexable elements are included in the index. This is necessary because journals, magazines and newspapers as well as bulletins and newsletters contain contributions of widely different types, lengths and importance. Examples of document types published in periodicals are: articles, news items, editorials, letters to the editor, personal views, book reviews, illustrations, and advertisements which may or may not warrant indexing. Only a few of these may be indexed. Guidelines similar to those postulated by Wellisch (1994:627) may be adopted and indexed as follows:

- articles, ie contributions with a title signed by one or more authors and at least one page in length, must be indexed;
- editorials though most often less than a page long, are indexed;

- minor news items and fillers may be disregarded but personal news, even though brief (eg elections, appointment, prizes, obituaries, etc) should be indexed because they are among the frequently sought items in periodicals;
- book reviews should be indexed by authors, titles and reviewers and at least some letters to the editor, especially those pointing out errors and omissions, depending on the nature of periodical, the nature of users and the allowable size of the index;
- advertisements should be indexed for particular user needs.

A policy on the terms to be selected for use in the index is necessary. This is necessary due to the great variety of terminology used by different authors for the dissimilar issues even in highly specialised journals and the much more divergent topics discussed in periodicals of a general or disciplines of a wide nature. It is necessary to strive for a high degree of consistency in the choice of indexing terms, not only for a single volume but also as far as possible for those of several years, in order to provide continuity for retrospective searches – this study has found it to be as important for printed as for electronically stored indexes. Libraries use controlled indexing language, whereby terms are assigned using a thesaurus, but they also use author's terminology if no suitable thesaurus term is available or a new term is deemed to be important enough to be indexed. Changes in terminology will inevitably take place and have to be accommodated. Keywords in articles are also identified and incorporated as index terms.

A policy on the depth of indexing to ensure high degree of exhaustivity of periodical indexes is necessary as well. This study found that most searchers of databases are not aware of indexes. This means that they lack information they could have used to increase precision of their searches. Differences in indexing policies existing in university libraries, affect retrieval of periodical articles held in the libraries. Some of the libraries have adopted a policy of not indexing at all. According to them it would be a waste of time indexing when this has been done elsewhere. They simply receive periodicals, record and shelve them and rely on commercial indexes prepared

elsewhere without knowing the indexing policies in use. The study further noted that most university libraries in Kenya operate without regard to whether the indexes in use cover all periodicals held in their collections. The libraries assume that the acquired printed indexes will enable the users and the person serving them to retrieve all relevant articles, which in most cases is never the case as the majority do not cover periodicals held in their collections.

The policy on in-house indexing varies from one library to another, with only one library indexing all issues of periodicals received. Thus users are expected to use indexes which are not all inclusive to get information contained in all the periodicals held. This does not guarantee maximum retrieval particularly for relevant information contained in a periodical that does not meet the indexing criteria. From the observations made during the study, university library users often come for specific information to achieve a specific purpose, mainly for research projects. Thus, the reasons cited by libraries for indexing their periodicals in-house point to the very nature of information-seeking habits of university library users. They have to get relevant information and it has to be within a given time frame. It does not matter whether the information required is in a journal, newspaper or magazine. Indeed, there are feature articles in newspapers and magazines that cover scholarly issues. Libraries index only certain categories of periodicals and only two libraries index both journals and newspapers. The libraries which index journals, according to the results of this study, did so in order to: expose subjects of articles contained in the journals; provide a subject approach to contents of their journals; improve on usability of journals held by exposing articles by subject; facilitate for identification of relevant article; and ensure that those looking for information have easier access to relevant articles.

Individual libraries in Kenya make varying decisions during the indexing process some of which include: whether the information is relevant to university library users; currency of the articles; which aspects to include in the index; number of terms to be assigned per article; which terms are likely to be used by the users to search for the article; and whether the articles are relevant to academic levels and disciplines on issues agreed

upon by the library management. This confirms the position maintained in the literature that each indexing agency will have its own priorities and will index with this in mind. Libraries have to ensure that they index all periodicals considered to be of value to a university user and not just according to the dictates of the existing curricular which ends up leaving out just what a user might require in future for his or her project, once the item is available in the library.

Public universities are universities established by Acts of Parliament and largely supported by public funds. Private universities are universities established in accordance with Universities Act 1985 (Cap 210B) and Universities rules, 1989. The universities operating with letters of interim authority are those universities that have applied to the Commission for Higher Education, further establishment and fulfilled requirements as stipulated in the universities rules, 1989, and have been issued with letters of interim authority by the Commission for Higher Education. Private universities with certificates of registration are those universities, which were offering degrees before the establishment of the Commission for Higher Education in 1985 and were issued with certificates of registration as fulfilling the requirements set out in the Universities rules in 1989 (Commission for Higher Education 2006).

5.6 PROSPECTS OF IN-HOUSE INDEXING IN UNIVERSITY LIBRARIES IN KENYA

Indexing is an expensive venture and for it to be undertaken there must be a perceived need for it; there should be a policy on the indexing of periodicals; there should be competent indexers; and willingness of libraries to index their periodical collections.

5.6.1 Need for in-house indexing

To justify the increasing expenses of the costs of periodical subscriptions, university libraries must improve access to services to the collections through the wise implementation of technology (Kirk 1991:298). There is a general agreement that university libraries in Kenya should index periodicals held in their collections. In particular, the respondents interviewed emphasised the need for the indexing of all

periodicals held in each library for maximum identification of relevant articles contained in the said periodicals. The libraries which do not index their periodicals are still maintaining the traditional approach of keeping and looking after collections. Librarians indicated that they need a comprehensive index covering information contained in periodicals held in their collections and in other university libraries in Kenya. Such index is necessary to enable users to identify articles contained in periodicals held in the country. The majority of the library users indicated that they often needed information contained in periodicals held in their libraries and in other university libraries in Kenya for their projects but are unable to do so. They have to rely on browsing through issues of periodicals to locate information for their projects, a practice which is time-consuming and often fruitless. They hardly get time to go to other libraries to browse through their periodicals.

5.6.2 Periodicals to be indexed

The main reason for advocating the indexing of periodicals in university libraries in Kenya is vested in the role periodicals play in providing information to the university community. There exist several volumes of periodicals in all university libraries covered in this study. The periodicals are received and shelved without any effort to expose their content to most university libraries in Kenya. This is contrary to the retention policies of information centres. All the periodicals retained as part of the library collection should be indexed to enable those interested in the information therein to quickly identify relevant information and access it. The libraries have lists and/or catalogues of periodicals held, but these only identify the periodical titles, not the articles published in them.

For university libraries, emphasis on indexing should not be limited to areas taught but whether the information may have utility for a university library user. What is not being taught today will sometimes be taught in the future. Libraries are expected to acquire and process information in anticipation of future use, and should therefore not limit themselves to the present state of the development of courses taught. All available periodicals should be indexed by libraries irrespective of the subject as these are at the moment under-utilised since most of the users do not know of their existence. It is also

expected that periodicals on subscription are of significance to the university library users. The need to expose their content through indexing is quite obvious.

5.6.3 Availability of indexers

University libraries in Kenya have employed a number of librarians to classify books, since all books have to be catalogued for effective retrieval. The libraries can employ librarians to index periodicals, if there is sufficient justification to their parent institutions of the need to index. This was suggested during interviews with librarians.

Presently, the number of librarians involved in indexing of periodicals is still small. Besides, in libraries that index their periodicals, indexing is only done when there are no books to be catalogued by the librarians. This study has found that all the university libraries in Kenya have librarians and trained paraprofessional staff with degrees, diplomas and certificates in Library and Information Science, who are currently involved in the cataloguing of books. The cataloguing skills and expertise they have between them, makes this category of staff potential indexers. In the majority of the libraries at least one member of staff has concluded a formal course in indexing. Besides, library schools in Kenya like the library school at Moi University and the one at Kenyatta University teach indexing as a core unit of study for those pursuing degrees, diplomas and certificates in Library and Information Science. Graduates from these institutions are expected to index competently. Most libraries do not index their periodicals because of shortage of staff rather than lack of staff with indexing expertise. It has been observed that if indexing were given the priority it deserves by the libraries, the available staffing and computing capabilities would be seized and taken advantage of to establish indexing as a major activity in the libraries that would benefit the library users.

5.6.4 Willingness of libraries to index periodicals

University libraries in Kenya are willing to index their periodicals either individually or jointly with other university libraries. Some have advocated for a joint indexing initiative. This would, as suggested by the librarians: facilitate faster and richer research search outputs; help in achieving more effective resource sharing; give awareness to users

about the knowledge base in the country particularly when the computers are fully linked through a network; increase consistency and cut down on duplication of resources and minimize the problem of duplication of effort; provide access to wider resources and sharing of resources amongst the libraries; enable users to be more informed of what other libraries have and are doing; avail the joint local university libraries' database to the world outside; make it possible to access information wherever it is available within Kenya; present the possibility to take advantage of current technological advancements to facilitate the exchange of information through the internet; save the time and money spent by the user when looking for information; enhance dissemination of information; and enable university libraries in Kenya to own a database on the Internet and realise a feeling of ownership and leadership as pace setters in the provision of information in Kenya. Of concern was that, although libraries see the need and are willing and ready to index their periodicals in-house, indexing is not given the enthusiasm and priority it deserves, as has been explained above.

A cooperative venture in indexing of periodicals has been described by some of the librarians as being a brilliant idea that should be initiated by university libraries in Kenya. During interviews, it was revealed that the majority of the libraries have joined PERI and pay 20% of subscription costs to access databases containing over 8 000 scholarly periodicals. They are able to download full-text articles considered relevant to their users with permission to repackage some of these to meet local requirements. This initiative if supported by local in-house databases, should transform the provision and access to periodical information for the benefit of research and study. The findings of this study clearly show that the majority of the libraries are willing to index their own periodicals individually and share databases by making them available on the Internet. The study has further indicated that all university libraries in Kenya are willing to join a joint indexing project, if established.

5.7 BENEFITS OF IN-HOUSE INDEXING OF PERIODICALS TO UNIVERSITY LIBRARIES IN KENYA

All libraries in Kenya consider it beneficial to index periodicals in-house. Among other benefits, in-house indexing: would make it possible to easily and quickly locate

published articles on a given subject discussed in periodicals thereby saving the user time which at the moment is spent browsing through issues and volumes of periodicals that might not be having any information of relevance; and would also make it possible to ensure that once a periodical has some information relevant to a researcher's need it is identified and retrieved, thereby giving the periodical a better retrieval and utility ratio. More users would likely be made aware of useful existing periodical information within the country and therefore the periodicals would be used more effectively and profitably than when nobody knows what they contain or about their existence.

Libraries which index in-house are able to continue searching their indexed data stored in their in-house databases unlike subscription databases which lock out subscribers once the subscription period lapses. Apart from this, indexing periodicals in-house would ensure repeated searches are conducted on own databases at no extra cost which would be cheaper than searching international databases for a given topic. The observations made revealed that researchers might seek for information on the same topic year after year as a basis for their research, particularly for less recent articles. Repetition of research topics or aspects of a topic is a characteristic feature of university search patterns. Library users do not travel to look for periodical information in other university libraries unless they are sure of getting relevant information by first searching through indexes of the other libraries. In some cases, travelling could mean distances of over 300 km, for example, from Maseno University located in Kisumu city to the University of Nairobi located in the city of Nairobi.

5.8 CHALLENGES OF IN-HOUSE INDEXING OF PERIODICALS

The study relied on literature reviews to find out the challenges that libraries face in in-house indexing since the study did not seek for this information from the respondents.

When looking for information, several help-seeking situations arise. These situations are related to the searching activities involved in getting started, identifying relevant collections, browsing, searches and evaluating results (Xie & Cool 2009:477). This poses challenges to libraries which must ensure that they avail indexes and that patrons

are assisted in the use of the indexes to identify relevant information from periodicals as they browse and narrow down the search to what they may consider useful and meeting their needs.

Although in-house indexing poses several challenges to libraries, one such challenge is to have indexes connected via online systems that respond to questions from users (Weaver 2006:18). The indexers have to direct patrons to the information they are seeking. According to Seckman (2009:82), indexers need an intuitive capacity to decide on what is important enough to be included in the index and also need to know how to index a particularly innocuous-looking subject while giving broad subject coverage to the articles. Many terms have multiple meanings with regional and national variations in end products. Term selection, editing and maintaining quality and parallelism – using similar subentries for concepts, are some of the challenges faced during the indexing process.

Indexing negatives has been cited as another challenge (Wyman 2009:126). Indexing negatives refers to writing an index for something that did not happen or does not exist, but which does warrant mention. For instance, the English language provides appropriate words to describe negative states such as ‘’blindness” for what you do not want to see. However, if there is no such term how do we communicate what is missing when it is important or that which the absence is remarkable? For instance, the ancient world was described as ‘’North Western Europe’’ and “everywhere else”. Other areas are not mentioned instead they are only referred to as “others”. To get information about the areas which were referred to as “others” is a challenge. Which search term for instance, should be assigned to make retrieval possible?

Periodical indexing is undertaken to enhance access and retrieval of information contained in periodicals. During the indexing process, indexers face the challenge of making key decisions on priority periodicals to be indexed. Libraries have to decide on whether or not all incoming periodicals, all current periodical and all other periodicals have to be indexed depending on the library policy. Libraries may dedicate part of staff

to incoming periodicals and current periodicals and then move on to the rest. Dealing with database-related issues such as which search engines to be used, what data elements should be searchable, etc, setting up a database and developing the following modules:

- the authority module that has examples from other controlled vocabularies prepared libraries and indexing agencies;
- the indexing module – that includes automated indexing process and manual indexing process;
- the retrieval module; and
- the printed index module designed to organize authority list terms into a printable index.

The challenges include: what the database/website should accomplish, how it should be designed and to ensure that it is meeting user requirements. Staff to index periodicals need workshops, among other things, to discuss index terms, depth of indexing, independence of headings' and represented together; and multiple access points (Brown 2006:134).

Development of an in-house database has for some libraries gone beyond periodicals held in the library and incorporates sources from databases on the Internet. The challenge of development of an in-house database from online sources involves: planning, identifying relevant search terms and commercial online database; downloading citations; criteria for software selection; management interface; and custom indexing (Smith-Cohen 1993:9).

Most universities in Kenya have over recent years experienced high student enrolments without a corresponding increase in the staff component. Libraries might find it difficult to introduce in-house indexing owing to staff shortages. The main challenge to libraries will therefore be to justify increase in staffing to be able to undertake indexing and create in-house databases.

Marketing in-house indexing and databases is another challenge. Universities libraries should develop a marketing and publicity campaign strategy to address public awareness of in-house indexing, in-house databases and access to information. E-mail promotions should be arranged; articles about indexing and retrieval of information contained in periodicals should be published to promote awareness of databases and periodical indexing. The marketing should be conducted with the understanding that even in developed countries, libraries subscribe to hundreds of research databases yet patrons usually stick with the few with which they are familiar. A study has established that for undergraduates these are Google and Wikipedia and for graduates, there are a few databases which they learned about while in graduate school (Fuller, Livingstone, Brown, Wood & Porter 2009:287). To support their substantial investment in periodicals, both print and electronic, it is imperative that libraries make them easily accessible to patrons by ensuring that there is no disconnect between the resources and the patrons' knowledge of their existence. Every effort should be made by university libraries to expose information contained in periodicals through indexing and to educate their patrons on what is available and how to access the information from their periodical collections, both print and electronic.

5.9 SUMMARY OF THE CHAPTER

This chapter discussed the findings of the study based on set-out objectives. The need for access to information contained in periodicals held in university libraries in Kenya has been discussed as well as methods used to identify periodical articles relevant to meet user needs. This has been done in line with the expectations of library users and the need for libraries to invest in efforts aimed at assisting users to identify and access relevant periodical articles. The practices of periodical indexing in the few university libraries which index their periodicals including how they determine aboutness and indexing approaches, which are employed, have been discussed. A combination of concept analysis and user requirement has been seen as a denominator for indexing in university libraries. The feasibility of in-house indexing in Kenyan university libraries and the benefits of in-house indexing of periodicals in university libraries has been discussed. which includes enhancing the identification of information on topics/subjects

and saving of user time otherwise spent browsing through volumes of periodicals and the overall improvement of the usage of periodical articles that are often hardly noticed using the current methods of access, have been discussed.

Chapter 6 provides the summary of findings as well as the conclusions and recommendations of the study.

CHAPTER 6

SUMMARY, CONCLUSION AND RECOMMENDATIONS

6.1 INTRODUCTION

This chapter summarises the findings of the study and offers conclusions and recommendations based on the objectives and findings of the study.

6.2 SUMMARY OF FINDINGS

The purpose of the study was to survey the practices and current trends and identify the challenges of in-house periodical indexing in academic libraries in Kenya with a view to making suggestions towards the development of an appropriate tool for accessing information contained in periodicals.

The objectives of the study were:

- to provide an understanding of the principles, practice and development of periodical indexing;
- to determine the state of the art as regards to identification, access and usage of periodical literature in university libraries in Kenya;
- to examine the current practices of periodical indexing in university libraries in Kenya;
- to explore the feasibility for in-house indexing of periodical literature by university libraries in Kenya.

The first objective was fulfilled by way of a literature review as demonstrated in Chapter 2 while objectives two, three and four were achieved through a survey of university library users and libraries in Kenya as well as a document study of indexes used to identify information. The summary of the findings is therefore provided based on the aforementioned objectives as follows:

6.2.1 Periodical holdings in university libraries in Kenya

This study found that some university libraries in Kenya hold a large collection of periodicals and a number of them access online databases. The holdings are however few for most libraries. The range of the holdings in the libraries is between 60 and 150 000 bound volumes.

6.2.2 Identification of and users' access to periodical literature

The users' identification and accession of periodical articles is by browsing through issues and volumes of periodicals, using lists given by lecturers and published periodical indexes which are the main methods of identification of information contained in periodicals held in university libraries in Kenya. Lists provided by librarians and online searches made on international databases are used for identification of relevant periodical information in a few libraries. In-house databases and locally produced indexes are used as a means of identification in very few libraries. Most users do not request literature searches to be conducted for them by their libraries, as they are not aware that the library can provide the service. Some users are not alerted by their libraries to the existence of articles of relevance to their research interests.

Users would like to be given alerts as well as printouts of articles and to be assisted in the identification and access to relevant information needed for their study and research. The users are not assisted to identify relevant articles contained in periodicals held in other libraries. They do not visit other libraries neither do their libraries arrange to get periodicals on interlibrary loan for their use from other libraries as they lack information on the contents of the periodicals. The libraries do not assist users to narrow down their searches to relevant articles by limiting searches to specific points of view, concepts and aspects as well as methodologies used in studies. Most do not know the role indexes play as tools for locating periodical articles and therefore do not use them. Articles cited in indexes in use in libraries are in most cases not available in the periodicals held and no effort is made to assist users obtain the articles. The overall assistance given to library users during the process of identifying periodical articles by librarians is almost non-existent.

6.2.3 Expectations of users of periodical literature

With the advent of modern information-handling technologies, periodical literature users expect to be provided with electronic copies of articles; literature alerts; literature searches; interlibrary loan services; articles with relevant aspects including methodologies used in studies; and provision of quick quality services during their search for periodical literature. These services and products are not provided by most university libraries in Kenya at the moment. Self-identification of information mainly through browsing in periodical volumes and issues is what is predominantly used in university libraries in Kenya as a means of identification of relevant literature. Users are not happy with the range and quality of services accorded by their libraries. For instance, the respondents indicated that they are left on their own without effective tools to enable them retrieve the information they need from periodicals.

6.2.4 Practices of periodical indexing in university libraries in Kenya

The study established that most university libraries have not renewed subscriptions to indexing and abstracting journals for a long time. Consequently, some of the libraries are indexing periodicals in-house to ensure that the subject content of periodicals held in their libraries is exposed to enhance identification of relevant information. However, the majority of the libraries do not seem to have plans of indexing at the moment.

Libraries make varying decisions during the indexing process about the nature of indexing which include: whether the information is relevant to university library users; timeliness/currency of the articles; which aspects to include in the index; number of terms to be assigned per article; which terms are likely to be used by the user to search for the article; and whether the articles are relevant to academic levels and disciplines.

The usage of periodicals in university libraries in Kenya has been found to be much lower for journals compared to the use of newspapers in libraries which do not index their periodicals. Where periodicals are indexed, the following indexing characteristics have been found to be influencing retrieval of information: overall approach to indexing,

exhaustivity, specificity, correctness, consistency and indexing policies adopted by libraries.

It was observed that university libraries in Kenya employ a simplistic entity-oriented approach for indexing. The request or user-oriented indexing approach which makes a detailed study and logical analysis of user requirements and makes it possible to build an indexing language that provides a communication device between the indexer and the user, is used by only one university library in Kenya. It was also observed that viewpoints or facets are not provided for in most indexes existing in university libraries in Kenya. It is therefore not possible for users to specify or narrow down the searches to the required aspects. Researcher's needs were observed to go beyond what is known, as a number of them were requesting to be given what is new or added knowledge, which is not provided for in most existing indexes.

Due to the predominant use of card catalogues and printed indexes and not devoting much time to in-house indexing, most of the existing indexes lack a good hierarchy. The information seekers are forced to think of possible narrow terms which lead to retrieval failure in cases where the searchers are unable to come up with the narrow terms.

Although indexing correctness or absence of indexing errors is of overriding importance for retrieval performance, it is not being adequately addressed by indexers in university libraries in Kenya. The descriptors that should have been assigned are being omitted while those that should not have been assigned are included. This lack of completeness and accuracy is causing retrieval failure during searches.

The nine university libraries in Kenya which index periodicals have adopted indexing policies which serve as guidelines for decisions taken during the indexing process. Following these guidelines, four libraries index only current issues of periodicals; two index selected periodicals only and two index articles on certain subjects only. Only one library indexes all categories of periodicals. These policies centre on: which periodicals to index; what to index from each periodical; term selection; and depth of indexing. The

policies affect the overall retrieval of information as retrieval capability depends on the periodicals indexed and the index terms assigned for retrieval purposes.

6.2.5 Prospects of in-house indexing in university libraries in Kenya

Both library users and librarians have expressed the need for libraries to index their periodicals. This is also supported by the existence of large volumes of non-indexed periodicals in university libraries in Kenya; availability of indexers; ICT facilities; and expressed willingness of libraries to index.

6.2.5.1 Need for indexing periodicals held in university libraries in Kenya

Although the majority of the university libraries in Kenya do not index their periodicals at the moment, all 27 libraries reckon that indexing is necessary. They believe that indexing would expose subjects of articles contained in periodicals; provide a subject approach to contents of their periodicals; improve on usability of journals held by exposing articles by subjects; facilitate fast identification of relevant articles; and ensure that those seeking information have easier access to relevant articles.

6.2.5.2 Periodicals to be indexed

As regards the type of periodicals that are to be indexed in academic libraries in Kenya, the study found that some of the libraries index only journals; others index newspapers; some index what they consider to be useful to courses taught; a number index current journals only; and yet others index particular titles only. Although journals were the most indexed type of periodical, only current issues are indexed by all nine libraries which index periodicals. Thus a lot of periodicals are not being indexed owing to these restrictions. Users are therefore not able to quickly identify information that could assist them in their study and research although it could be contained in the periodicals. It has been found necessary to have all periodicals held in the libraries indexed for maximum usage.

6.2.5.3 *Availability of indexers*

Eight libraries have among their staff members librarians who are currently involved in the indexing of periodicals. However, this is only done when there are no books waiting to be catalogued. Also, indexing is not included in the performance targets of university libraries in Kenya as is the case for other library operations. All university libraries in Kenya have librarians and trained paraprofessional staff with degrees, diplomas and certificates in Library and Information Science currently involved in the cataloguing of books. The cataloguing skills and expertise they have between them, makes this category of staff potential indexers. Some library schools in Kenya, such as Moi University's School of Information Science and Inooro University's Faculty of Library and Information Science, teach indexing as a core area of study for those pursuing degrees, diplomas and certificates in Library and Information Science. Most libraries do not index their periodicals because of shortage of staff rather than lack of staff with indexing expertise. It has been observed that if indexing were given the priority it deserves in terms of staffing by the libraries, the available computing facilities would be seized and taken advantage of to establish indexing as a major activity in the libraries, and that would improve the identification and access to information contained in periodicals.

6.2.5.4 *Availability of ICT facilitates for in-house indexing*

The study has found that in universities where libraries have been aggressive enough to justify the need for computers as basic tools for information storage and retrieval, the libraries have been allocated adequate computers by their parent universities to meet their ICT requirements. Also, the cost of computers and accessibility to the Internet has been decreasing, thus making it possible for institutions to acquire these facilities. The Internet that in early years had been unreliable due to frequent blackouts and with slow response time, has improved. University libraries are taking advantage of the emergence of ICTs to enhance identification and access to information, particularly in the establishment and access to online databases. The study found that 22 libraries have five or more computers and some more than 20. Also, most of the libraries have

Internet connectivity. However, none of the libraries use the computers for indexing periodicals. All the nine libraries that index periodicals do it manually.

6.2.5.5 Willingness of libraries to index periodicals

The study noted that all the 27 universities libraries in Kenya are willing to index their periodicals either individually or jointly with others. In-house indexing is already in progress at some libraries, others have indicated they are willing and ready to start indexing their periodicals if the current impeding factors such as shortage of staff are addressed.

6.2.5.6 Collaborative periodical indexing

Academic libraries in Kenya consider joint indexing to be necessary for the purpose of effective resource sharing. A total of 25 libraries indicated that a joint indexing initiative could facilitate access to enormous amounts of information; help in achieving more effective resource sharing; give awareness to users about the knowledge base in the country particularly when the computers are fully linked through a network; increase consistency and cut down on duplication of resources and minimize the problem of duplication of effort; and provide access to wider resources.

6.2.6 Benefits of in-house indexing of periodicals to university libraries in Kenya

All the 27 university libraries in Kenya consider it beneficial to index their periodicals in-house. Among other benefits, in-house indexing would make it possible to easily and quickly locate published articles on a given subject contained in periodicals held by the library thereby saving users time which is otherwise spent browsing through issues and volumes of periodicals that might not have any information of relevance. It would also make it possible to ensure that once a periodical has some information relevant to a researcher's need, it is identified and retrieved and given to the researcher thereby giving the periodical more utility ratio.

The libraries would save on time and money by not ordering articles from overseas particularly those with information that is already contained in periodicals held yet not

known to users/ librarians due to non-retrieval for lack of an effective locating tool and yet this is what libraries have to do to cater for requirements of their clientele. Apart from this, indexing periodicals in-house would ensure repeated searches conducted in these databases that are also used to assist libraries to identify core areas of study and research of interest to their users. The observations made revealed that researchers tend to request information on the same topic year after year as a basis for their research. Repetition of research topics or aspects of a topic is a characteristic feature of a university search pattern which libraries have to capture to remain relevant in meeting user needs.

The study found that library users travel to look for periodical information in other university libraries when they are not sure of getting any relevant information. In some cases, travelling means distances of over 300 km, for example from Maseno University to the University of Nairobi; and that in-house indexing will facilitate research emanating from access to more comprehensive and thorough literature review as a result of identifying and utilising all possible available information in Kenya. More users are likely to be made aware of useful existing information contained in periodicals within the country and therefore the periodicals would be used more effectively and profitably than when nobody knows what they contain or of their existence. The study has found that some of the local information is not covered by international databases and indexes in libraries.

6.3 CONCLUSIONS

This study draws the following conclusions based on its objectives thus:

6.3.1 To examine the theory, practice and development of indexing as it applies to periodical indexing in university libraries

Both the theoretical and practical indexing in Kenya is a recent phenomenon and has not yet been fully developed. This has been partly due to lack of inspiration on the part of libraries and also the inability of library administrators in articulating indexing as a core task in their libraries to warrant the employment of indexers. Some libraries still

consider indexing as unnecessary and argue that most of what they receive is not scholarly and that good indexes are available on the market and there is therefore no need for in-house indexing.

The findings of this study noted that although university libraries in Kenya hold sizeable collections of periodicals covering a range of areas, users find it difficult to access relevant information in the periodicals. This can be attributed to lack of authoritative and all-inclusive access tools covering contents of the periodicals held in university libraries in Kenya. Users do not know of the existence of information relevant to their study and research contained in periodicals held in their libraries, and are also not aware of the contents of periodicals held in other libraries in Kenya.

Although indexing is practiced in some libraries in Kenya, indexing principles and rules are not followed consistently. The quality of indexing and the indexes in university libraries in Kenya are as a consequence, not effective for retrieval purposes. This is affecting usage of periodicals. Both the library users and the librarians expressed the need for assistance in locating information contained in periodicals. Browsing, which is the most commonly used method of accessing information in periodicals is awfully time-consuming, often turns out to be frustrating when given periodical issues do not contain information relevant to the needs of the user, and requires that one visit the library to browse through the issues of periodicals held in other libraries. There is a need for a user-assisted literature search service in university libraries in Kenya for maximum usage of periodical literature.

6.3.2 To determine the status quo with regard to the indexing, identification access and usage of periodical literature in university libraries in Kenya

The study noted that methods used by library users to identify and access information contained in periodicals were time-consuming, cumbersome, often unfruitful and therefore not effective for identification and retrieval of periodical information. The study has found lack of concern by a number of libraries in facilitating user access to

information contained in periodicals held in their collections. Most of them do not index but only receive, record and shelve the periodicals.

Due to variations in size of periodical holdings and development stages of universities in Kenya with some having more established facilities than others, it is inevitable that university libraries share the existing library resources. The findings of the study have revealed that library users are not assisted to get information concerning the existence of relevant periodical literature contained in other university libraries in Kenya that would lead to an increase in interlibrary lending. It has consequently been suggested by this study that libraries should as a commitment, provide relevant periodicals articles contained in their collections on request and that they should provide information about their existence, in order to assist scholars and researchers looking for such information. This is not possible at the moment and continues to take its toll on the research and scholarly output of universities in Kenya.

Provision of quality service in the usage of periodicals will remain a myth unless university libraries in Kenya give indexing of periodicals the same priority as that given to the cataloguing of books. Modern technology has changed information handling operations in libraries that have a vision and might not make a difference to the traditionalists that cite lack of manpower for not performing a task that is core to the actual usage of periodicals, ie indexing of periodicals. Library users in Kenya want to use periodicals and information providers have to index them to facilitate usage.

It can therefore be concluded that without a tool that can assist academic library users in Kenya to locate relevant information contained in periodicals held by the libraries, and without a well supported and co-ordinated acquisitions program and control of periodical literature, under-utilisation of periodical literature will persist. This will mean that university libraries in Kenya will continue to operate like isolated pockets neither adequately meeting their individual user requirements nor providing any meaningful assistance to clientele of other university libraries seeking for information from periodicals.

6.3.3 To examine the current practices of periodical indexing in university libraries in Kenya

The study found that university libraries in Kenya, which index their periodicals, employ a simplistic entity-oriented approach during the indexing process. Only one library uses the request or user-oriented indexing approach which makes a detailed and logical analysis of user requirements and makes it possible to build an indexing language that provides a communication device between the indexer and the user. It was noted that library users commonly request new or added knowledge but the existing indexes do not assist in identifying such information. It was also noted that errors of omission and commission existed in cases where the determination of aboutness is done poorly. The indexing policies adopted by most libraries have also been found to be limiting on which periodicals need to be indexed, a factor that has also been found to be hampering retrieval performance and access to relevant information contained in the periodicals as users are not assisted to determine which periodicals among those that are not indexed, contain information that is relevant to their requirements.

6.3.4 To explore the feasibility of in-house indexing of periodical literature in university libraries in Kenya

This study has explored the possibility of conducting in-house indexing of periodicals held as a tool that can be used for locating information contained in periodicals held in university libraries in Kenya. Results have revealed the existence of skilled manpower in university libraries in Kenya that can be deployed to index periodicals and there is evidence that where libraries have been aggressive in justifying the need for ICT facilities, these have been allocated. Libraries have shown their willingness to join collaborative indexing initiatives if established. The study concludes that in-house indexing in university libraries in Kenya is feasible.

6.4 RECOMMENDATIONS

This study has found an unquestionable need for the establishment of a viable in-house periodicals indexing system by university libraries in Kenya. In view of the importance of

periodical literature in institutions of higher learning and particularly in research, the following recommendations are made to address the current situation in the country. The recommendations are addressed to university administrators, periodicals librarians and library schools in Kenya. These recommendations address practical issues and suggest areas for further research to be addressed by a respective forum.

6.4.1 This study recommends the establishment of in-house indexing programs that should lead to the creation of an in-house database in each of the university libraries in Kenya and made available on the Internet for access by other libraries within the country and internationally

It is common knowledge that in today's information age, information seekers need faster access to information. The same applies to information contained in periodicals. Arrangements have to be made to make relevant periodical information known and available to users within reasonable time. University libraries in Kenya therefore have to facilitate faster access to information contained in periodicals held in their collections. The libraries also have to facilitate access to information contained in periodicals held in other university libraries within the country and internationally.

Each university library in Kenya should therefore index all periodicals held and establish a database comprising the indexed data. The databases should then be made available on the Internet for access by information seekers in Kenya and internationally, at a fee, on shareware or even free of charge. This should foster more effective utilization of periodicals held in their collections and in other university libraries in the country and beyond, for the furtherance of research and scholarship. Good examples of periodical indexes that the university libraries in Kenya can emulate include the S4 media, which is produced by the University of Free State, South Africa and hosted by the South African Bibliographic and Information Network (SABINET).

The aim of in-house indexing should be to enable library users and information providers to identify articles contained in periodicals held in their libraries by exposing their subject content and sought points-of-view and enabling users to search using these entities. The ultimate aim of in-house indexing should therefore be to widen the

scope of periodical references consulted by users in university libraries in their individual libraries and beyond. This should be done fast enough, respecting user levels and orientations and meeting the deadlines through development of databases containing indexed data. When these databases are made available on the Internet, they will give university libraries in Kenya something to share with the rest of the world. Most importantly, they will provide scholars and researchers based in Kenya and outside the country with a useful guide to information which they might require for their study and research. For this to eventuate, libraries will among other recommendations cited below, give the indexing of periodicals equal priority to that which is given to the cataloguing of books. They will for instance, have to provide adequate staff to index periodicals. The actual staffing requirements will depend on the expected volume of indexing to be performed in the individual library.

6.4.2 The study recommends the provision of adequate, proficient and dedicated staff in each university library in Kenya for indexing periodicals in-house

University libraries in Kenya have to ensure that maximum use is made of the periodicals held in their collections by having them indexed. For effective in-house indexing, it is imperative that proficient, adequate and dedicated staff is provided for indexing the periodicals in-house by each university library. The staff responsible for indexing should be well-trained and equipped with adequate skills in indexing to enable them to competently determine the required level of aboutness of periodical literature and generate suitable concepts and search terms. Such expertise is crucial to determine concepts and search terms and is likely to lead to high retrieval performance.

Each library should provide adequate staff to index periodicals, as is the case for the cataloguing of books. This should be done with the understanding that users need vital sources of information in their search for information for their projects, and periodicals convey the most up-to-date information in respective fields of study and research.

6.4.3 The study recommends the acquisition of hardware including computers and appropriate software for indexing purposes

Each university should facilitate the acquisition of hardware including computers and appropriate software for the establishment of a viable periodical indexing system. This should include ensuring that the Internet connectivity is provided to link the libraries with the rest of the world. Computer and associated hardware are vital tools for information storage and retrieval which university libraries cannot do without if they are to continue to offer quality information service to users. Knowledge management has become an important component of academic life. As a result, universities have no alternative but to invest in technology in order to keep abreast with the access to knowledge.

6.4.4 The study recommends the establishment of an indexing policy and that whatever indexing policy has been decided upon, libraries should ensure that it is followed consistently and that it is also known to all university libraries in Kenya

University libraries should establish indexing policies and the policies followed by each university library should be made known to all university libraries in Kenya. This would ensure that those indexing and those searching on databases are well guided and operate within the policy framework. The preferable option recommended by this study is for the libraries to establish a common indexing policy to be followed by all university libraries in Kenya. The policy should facilitate the creation of compatible in-house periodical databases and spell out condition for access to the databases. University libraries in Kenya therefore need to form an indexing consortium for this to be possible.

Since the databases are eventually to be linked to the Internet, it is important that they are created in a compatible form. This will facilitate exchange of information on different databases available in university libraries in Kenya and make them suitable for interfacing with others that may be available on the Internet.

Databases are expensive to develop. University administrators in Kenya should therefore work out the cost of access to enable those involved in the development and

maintenance, generate some income to sustain further development. Libraries contributing to the databases should either have free access or subscribe at a concessionary fee. Non-contributing libraries should pay a commercial fee to access the databases. Actual fees and other access conditions have to be spelt out by the participating university libraries in Kenya.

Each university library should be compelled by the policy to index periodicals held in its collection and build up a database which can be made available on the Internet for use by other university libraries in Kenya.

Libraries should undertake to supply relevant articles contained in periodicals held in their collections. This should be done by making arrangements for users to have access to the periodicals or by providing information about the existence of relevant data to potential users of periodicals throughout the country, for them to make photocopy requests. Libraries should also establish clippings collections of indexed material and make these available to users. A policy should be put in place by the accrediting agency in Kenya to make university library participation in the said network a mandatory requirement for accreditation. The policies so decided upon should be revised periodically to keep in line with the development in world trends in information technology.

6.4.5 Although there is no agreement on the broad approaches to indexing, this study recommends that the indexers should not focus entirely on the contents of the documents but attempt to anticipate the potential use of a particular document

The study has found that there is little attempt to explicate a specifiable procedure for deciding on aboutness. Broad approaches to indexing apply the process of reduction or some kind of semantic condensation. Summarization is seen as a process of identifying and selecting subjects which together sum up the message of the document. In contrast to the aboutness approaches, at the same time challenging researchers in automatic indexing to consider their methodological weakness, the present study supports the

view maintained by key researchers, Blair (1986:241), Hjorland (1992:200), Weinberg (1988:6) and Soergel (1985), which point towards ways of looking at indexing. The views reinstate the concept of subject in the leading part of the practice and theory of indexing, stressing that primary function that indexing should serve is the search for knowledge. Thus, the contents of the document and the anticipated impact and value of the document for potential use should be the main focus during the indexing process.

Since the indexed documents are expected to be utilized by undergraduates, Master's, PhD and postdoctoral researchers and authors, differential requirements of these categories of clients should be put in perspective and catered for by university libraries when indexing periodicals. The present indexing approach in Kenya fails the researcher because the indexers take simplistic approaches to provide the aboutness rather than the aspect that is the point-of view or innovation of a document, which cannot readily be perceived by interpreting the document as an isolated source of knowledge. The approach to indexing should be both entity-oriented and user-oriented and should provide for the differential requirements by being both exhaustive and specific in approach.

6.4.6 The study recommends that indexing should as far as possible specify points-of-view, aspects of articles and the methodologies used in various studies, to enable retrieval of relevant documents for potential users. This should be achieved through exhaustivity and specificity of indexing

Although some library users (mostly undergraduates) indicated that they do not require their articles to be narrowed down to those covering specific points-of-view, aspects of articles and the methodologies used in various studies, observations made during this study have revealed that these are crucial elements, commonly sought by graduate information seekers and other library users.

The indexing level should therefore enable university information providers to assist their clients to narrow down the searches as to references, articles and/or information

relevant to their requirements and levels of specialization and cater for anticipated use. The indexing level should be exhaustive and include levels of specificity that will meet the requirements of post-doctoral researchers as well as the undergraduate student. Libraries should ensure that as they index, facets required for specifying points-of-view, methodologies, approaches used in various studies are included in their indexing language. These are necessary for meeting specific requirements of users that are more sophisticated in their requirements.

It is expected that for information to have utility for these categories of users, it will have to possess particular aspects they are looking for and this has to be brought out clearly during indexing.

6.4.7 This study recommends that periodical librarians draw up standard guidelines to be followed by indexers on specificity, exhaustivity and choices of indexable items, based on the indexing policy of university libraries

This should ensure consistency during the indexing process. The study has found cases of indexer inconsistency to prevail. It is therefore important that indexers follow guidelines to limit incidences of inconsistency where this can be avoided. Apart from this, indexers have to look beyond the present requirements since most universities in Kenya are still developing what is not being taught today will be taught tomorrow and so on.

6.4.8 For effective periodical literature search services to be provided by each university, this study recommends that each university library should ensure that the indexing system so established is comprehensive, reliable and tailored to meet search requests made by their clientele with speed and maximum results

Such system should ensure that:

- periodicals held in each university library are indexed and the data input in an in-house computer database which should constitute a search and access tool to the library's periodical literature;
- all pieces of information considered to be of utility to any category of university user or information seeker are indexed and entered in the in-house database;
- all terms considered to be useful as well as possible search terms for a particular article arrived at through the analysis of the document and from the user's perspective, are incorporated in the index to facilitate retrieval;
- such terms are assigned competently with guidelines clearly spelt out in a guide made available to university libraries in Kenya;
- the indexing tool (in-house database) should clearly show which library has indexed the item; and
- availability of the periodical issue or article must be guaranteed by the indexing library and arrangements made to have it delivered to the requesting user.

The rationale here is that if such an indexing system is put in place, it would enable users to locate relevant information and/or articles contained in periodicals held in individual libraries within the country, and such could be supplemented by available international search initiatives and that this would be done in real time. It would also ensure that so long as the sought information is contained in a periodical held in the country, it would be identified and made available to the user.

6.4.9 The study recommends that each university library in Kenya should establish an effective periodical alert service by maintaining user profiles with suitable keywords

Each university library should ensure that suitable search terms are generated for incoming articles and/or periodical information that are topically relevant, pertinent and considered to have utility for university library users. Keywords covering user requirements have to be stored in the computer. As searches are conducted periodically, all relevant information should be flagged and passed on to library users whose profiles match the information.

The basic information to be stored in the database for each library user (or group of users) and matched with incoming periodical data should include the following to facilitate faster and richer research search outputs:

- user name
- department/course/address
- category (staff/student/outsider/author)
- level (PhD, Master's, undergraduate, other)
- research topic
- keywords/subject/concepts
- date of request
- date of completion/deadline

6.4.10 The study recommends that an effective information literacy programme, targeting identification and access to periodical literature be mounted for the benefit of all users

The program should aim to introduce users to the key indexing tools and databases available in the library. The programme should include mention of user services and assistance given to researchers by library staff, such as literature searches, interlibrary loan requests and photocopy procurement from other libraries should be brought to the attention of all users. This should be followed by detailed sessions designed to educate them on search strategies and on the usage of indexing tools and databases held in the library and the need to consult them.

Such sessions should ensure that the users are conversant with the available tools and are able to put them to maximum use. More over, the users should be encouraged to consult the librarians in cases of any problems on the use of the tools as well as presenting their search requests for assistance. This is important as the findings of this study indicated that most of the researchers were not familiar with indexing tools held in their libraries and therefore hardly used them.

6.4.11 This study recommends that university librarians should initiate the formation of an indexers' consortium whose membership should be librarians from university libraries in Kenya involved in the indexing of periodicals

The indexers' consortium should provide a forum where librarians involved in indexing should be able to discuss issues relating to the indexing of periodicals. Some of the issues should include the indexing language, standards, terminologies, methodologies, approaches and developments; periodical holdings, selection and duplication; and development, maintenance, networking and usage of in-house databases. The indexers should hold meetings regularly and on a rotational basis. Demonstrations by the hosting library should precede the meetings to give members the opportunity to make suggestions on possible improvements where necessary.

6.4.12 This study recommends that library schools should emphasise the theoretical and practical aspects of periodical indexing

All institutions offering courses in Library and Information Science, should offer indexing as a compulsory subject. This will ensure that the graduates who later take up duties that include indexing have the necessary skills, besides being familiar with the subject matter in respective areas in which they are indexing. As revealed by this study, good retrieval of periodical information depends on the correctness and quality of indexing. It is therefore important that the indexer is adequately prepared during training. This is necessary to avoid the present simplistic approach to indexing currently prevalent among the university libraries in Kenya. This training should emphasize both the entity approach and requirements approach to indexing.

This study has further revealed the need for improving on professionalism and self-efficacy that seems to be lacking among the crop of librarians coming from some training institutions. The periodical librarian's professional obligation in university libraries is to ensure that users get the periodical information for study and research. This is supposed to be achieved by ensuring that the periodicals they require are acquired and processed to a point of maximum use. This role has been found by the

study to be dormant among most periodical librarians in Kenya. The urge to index periodicals by libraries in Kenya has no comparison to what existed among libraries in the developed world during the early years of development of periodical indexing. The indexing done by librarians has no trace of the efficiency and professional concern revealed by this study, which is exhibited by librarians in the developed world. This comes out strongly as one of the factors that may partly be responsible for the almost non-existence of periodical indexing in the majority of the university libraries covered in this study.

The findings of this study have shown that Kenya is yearning for librarians who have a high sense of professionalism and self-efficacy to adequately face the challenges ahead, particularly as far as access to periodical literature is concerned. The economic conditions are hostile as resources continue to dwindle and many areas of greater priority are given preference. Professionals in various areas have to be well-prepared to successfully further the aims of their professions. Training institutions in Kenya which offer courses in Library and Information Science have to certainly understand this as a point of concern and prepare students to be more professional in their practice and to show reasonable drive in furthering the information-provision role in their respective capacities. With the advent of the information technology, indexing has been incorporated in library tasks in the developed world while it still looks as though most libraries in Kenya might not find it worthwhile to utilize their computers for this task several decades later.

6.5 SUGGESTIONS FOR FURTHER RESEARCH

There is a need for further investigations aimed at developing the body of knowledge for in-house indexing of periodical literature and popularising indexing among university libraries in Kenya. Such research should attempt to throw more light on:

- why the urge to index periodicals is low among librarians in Kenya, yet indexing continues to be seen as a vital tool for periodical information retrieval, elsewhere ; and

- why some libraries are taking too long to start indexing their periodicals (some indicated they had plans to start but have yet to start). The present study did not exhaust reasons behind the delay in commencement although lack of manpower came out clearly. It would seem that the low rating of the value of indexing contributes significantly to the delay.

There is a need to revisit the future of in-house indexing in the light of growing proliferation of databases.

A cost-benefit analysis of in-house indexing was not covered. The study relied on the expressed views of librarians. The need for an empirical study to explore this is highly recommended.

A study to investigate the approaches for determining aboutness in periodical indexing requires further investigation. This study has established that although the present approaches to determine aboutness are more indicative of the notion of the subject or the aboutness, they provide little insights into the mental process involved in subject analysis. The inadequacies of present indexing procedures, problems of low inter-indexer consistency and inadequate explications of aboutness analysis, suggest that research might fruitfully begin by focusing on the mental processes involved in summarisation. There is therefore a need to find new ways of looking at indexing as has also been suggested in the literature reviewed. The study therefore recommends that future investigations could centre on the actual processes involved in the determination of aboutness in an effort to further develop a framework for a scientific approach to indexing and on the investigation of the impact of in-house indexing on the usage of periodical literature.

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APPENDICES

APPENDIX 1: LETTER TO RESPONDENTS TO QUESTIONNNAIRE 'A"

Mr. Peter Matanji
Lower Kabete Library
University of Nairobi
P.O. Box 30197, Nairobi.
Tel. 732160 Ext. 238

Dear Respondent,

RE: QUESTIONNAIRE ON INDEXING OF PERIODICALS HELD IN UNIVERSITY LIBRARIES IN KENYA

I am currently carrying out a research on in-house indexing periodical literature in University libraries in Kenya.

As a way of facilitating this study, I am kindly requesting you to complete the attached questionnaire covering the information which I require. I will deeply appreciate your cooperation in this regard.

Any information given by you will be treated confidentially.

Thank you.

Yours faithfully,

Peter Matanji.
Senior Librarian
Lower Kabete Library – University of Nairobi

APPENDIX 2: QUESTIONNAIRE "A"

The questionnaire consists of four parts. Part A seeks for Biodata information, Part B seeks for information on holdings of periodicals, identification, access and usage of periodical literature, Part C seeks for information availability of indexes and databases in university Libraries, and Part D seeks for information on feasibility for in-house indexing.

Please complete all questions by either ticking where appropriate or by filling in the space provided.

PART A: BIODATA INFORMATION

(i). (a) Name of the
Institution……

(b) Name of the library (if branch, give branch name)

……

(ii) Size of staff:

Professional librarians ☐

Paraprofessional library Staff ☐

Others ☐

(iii) Size of library users:

Undergraduates ☐

Postgraduates ☐

Academic staff ☐

Other ☐

(iv) Seating capacity of the library:

Readers ☐

(v) Please state your job designation……

(vi) For how long have you been working as a librarian?.....

PART B: HOLDINGS OF PERIODICALS: IDENTIFICATION; ACESS; AND USAGE OF PERIODICAL LITERATURE

1. What is the approximate number of volumes of periodicals held by your library?
   ☐
2. Which of the following periodical article identification methods are commonly used in your library? (Please tick)

Browsing through issues & volumes ☐

Reading list s given by lectures ☐

Reading lists given by librarians ☐

Using acquired indexing & abstracting journals ☐

Online searches prepared by vendors ☐

Locally produced periodical article files ☐

In-house databases ☐

Others ☐ (Please specify)

……

3. What efforts are being made by your library to help users identify articles contained in periodicals?

(a) Held by your library?

……

……

……

(b) Held by other libraries?

……

……..

……..

4. In the process of providing services to users, how often are you able to identify periodical articles in periodical indexes held in your library using terms given by library users?

Always ☐

Sometimes ☐

Rarely ☐

☐

Not at all

5. (a) Do you maintain periodicals users profiles?

Yes ☐ No ☐

(b) If yes, give the main details maintained in the profile record (e.g. username, number, etc)

…….. ……...

……

……

PART C: PROVISION OF INDEXES AND DATABASES

6(a) Do you subscribe to any indexing and abstracting journals (Please tick)

Yes ☐ No ☐

(b) If yes, please indicate the year when you last renewed your subscription to the indexing and abstracting journals ☐

(c)How much money was allocated by your library for renewal of indexing and abstracting journals this financial year?

.....

7(a) Do you subscribe to any international databases?

Yes ☐ No ☐

(b) If no, please give reason(s)

…….

…….

…….

(c) If yes, which one(s), please list them

(i)…… .

(ii) …….

(iii) ……

(etc)……

(e) Are you able to print full text articles retrieved online?

Yes ☐ No ☐

(f) Is there an extra charge for articles printed online?

Yes ☐ No ☐

(g) How do you describe satisfaction of host service so far in terms of response time, convenience, etc?

Excellent ☐

Good ☐

Moderately good ☐

Unreliable ☐

Not worthwhile ☐

Other ☐

8. (a) Do the owners of the database allow your library to download contents of their database into your local in-house database? Yes ☐ No ☐

(b) If no, give reasons

……..

……..

…….

(c) How do you describe the response time for online searches on overseas based database during the day?

Quite quick ☐

Moderately quick ☐

Slow ☐

Very slow ☐

No access most of the time ☐

9(a) Do database owners allow you to repackage the data held in their database once Subscription has been renewed? Yes ☐ No ☐

(b) If no, give reasons……..

10. Does the host database provide you with facility for viewing contents pages of each periodical indexed?

Yes ☐ No ☐

11.(a) Is it necessary to have a database developed by your library to be used alongside host database services? Yes ☐ NO ☐

Give reasons for your answer to 23(a) above

……

……

……

b) Do you sometimes download contents of databases available free of charge on the Internet?

Yes ☐ No ☐

12(a) Do you sometimes find new concepts used in the database?

Yes ☐ No ☐

(b) If yes, how do teaching staff in your institution know of the new concepts when these are in a database, for them to be able to use them in their teaching and research?

……

……

……

……

13 (a) Do you index your periodicals? Yes ☐ No ☐

(b) If no, do you have plans to start indexing your periodicals? Yes ☐ No ☐

(c) If no, which of the following describe your reasons for not indexing (Please tick all the ones that apply)

It is unnecessary ☐

Lack of Funds to pay indexers ☐

Lack of sufficient time ☐

Shortage of staff ☐

Lack of computing facility ☐

Lack of expertise ☐

Any others (please cite)

……

……

……

(d) If you do not consider it necessary to index your periodicals, please give reasons below

……

……

……

(e) Do you think indexing enhances usage of periodicals? Yes ☐ No ☐

(f) Do you need a comprehensive index covering articles contained in all periodicals held in your library? Yes ☐ No ☐

(g) If no, please suggest available options which you rely on

……

……..

……..

IF YOUR ANSWER TO (13a) ABOVE WAS YES, PLEASE ANSWER QUESTIONS 14-19 BELOW

14. Which of the following categories of periodicals do you index? (Please tick)

Journals ☐

Magazines ☐

Newspapers ☐

Others ☐

15. What is your policy on the periodicals indexed? (Please tick below)

Index newly acquired issues only ☐

Index certain titles only ☐

Index selected periodicals only ☐

Index articles on certain subjects only ☐

Index all issues ☐

Index issues not covered elsewhere ☐

Any other ☐ (Please specify)

……..

……..

……...

16. Which of the following indexing approaches (methods) do you use?

(a) Based on aboutness & concept analysis ☐

(b) Based on user requests ☐

(c) Both a & b above ☐

(d) Other (Please specify) ☐

……

17. Do you index manually or with computer assistance (please tick)

Manually ☐ with computer ☐

18.. Which decisions do you make while indexing? Please use space below

……

……

……

……

19.(a) How do you approach the article to be indexed to determine concepts? e.g. do you read whole text?

……..

……..

……..

(b) Do you think there is need for differential indexing to cater for undergraduates, postgraduates, and doctoral researchers more effectively?

Yes ☐ No ☐

Please give your reasons

……

……

PART D: FEASIBILITY FOR IN-HOUSE INDEXING

20. What is the number of your library staff involved in the classification of library material?

Librarians ☐

Library Assistants with Diploma ☐

Library Assistants with certificates ☐

☐

Any other

……..

……..

21. (a) How many professional staff are involved in indexing periodicals in your library?

(b) How many professional staff are involved in cataloguing of library material? ☐

(c) Do you have any backlog in terms of periodicals waiting indexing? ☐

Yes ☐ No ☐

22. How many of your staff have done an indexing course? ☐

23. (a) Do you think it is important to have a joint effort by Kenyan University libraries to index their periodical and put them in a database for the purpose of resource sharing?

Yes ☐ No ☐

(b) Give reasons for your answer

……

……

24. In your opinion, are there any benefits, which your library can realize by indexing its periodicals in-house? Please state them

……

……

……

25. Would you consider in-house indexing of periodicals held by your library as being cost effective?

Yes ☐ No ☐

26. Please comment on the readiness and willingness of librarians in your library:

(a) To index your periodicals in-house

…….

……..

…….

(b) Join a periodical indexing project if established.

…….

…….

…….

…….

APPENDIX 3: LETTER TO RESPONDENTS TO QUESTIONNAIRE "B"

Mr. Peter Matanji
LowerKabete Library
University of Nairobi
P.O. Box 30197
NAIROBI
Tel. 732160 Ext. 238

Dear Respondent,

RE: QUESTIONNAIRE ON INDEXING OF PERIODICALS HELD IN UNIVERSITY LIBRARIES IN KENYA

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Thank you.

Yours faithfully,

Peter Matanji
Senior librarian
Lower Kabete Library – University of Nairobi

APPENDIX 4: QUESTIONNAIRE "B"

1. Which of the following periodicals do you use frequently? (Please tick)

Journals ☐

Magazines ☐

Newspapers ☐

None of the above ☐

2. How often do you consult periodicals? (Please tick the one that applies)

Daily ☐ Weekly ☐ Occasionally ☐ Never ☐

3(a)What do you consult journals for?

(Please tick and rate in order of priority use by assigning numbers from 1-5)

Research information ☐

Class assignment/project ☐

Catching up with news ☐

Leisure reading ☐

Others ☐ (Please specify)

……

……

……

(b) What do you read newspapers for? (Please tick and rate in order of priority use by assigning numbers from 1-5)

Research information ☐

Class assignments/projects ☐

Catching up with news ☐

Leisure reading ☐

Others (please specify) ☐

4 (a) Does your library assist you to get periodical references and articles whenever you require them?

Yes ☐ No ☐

(b) If no, which of the following methods do you use in identifying useful or relevant references and articles on a given subject from periodicals?

Lists given by librarians ☐

Reading lists given by lectures ☐

Browsing through issues of periodicals ☐

Using indexes and abstracts ☐

Conducting computer searches ☐

Any other ☐

(Please specify)……...

……

…….

5(a) Do you normally give your librarian details of your literature requirements?

Yes ☐ No ☐

(b) If yes, how often do you visit him/her for the literature?

……

.

(c) Do you see this as a necessary service? Yes ☐ No ☐

(d) If no, give reasons …….

……

6(a) Does your library alert you whenever an article relevant to your academic interest is contained in newly acquired periodicals? Yes ☐ No ☐

(b) If no, would you like to be alerted whenever your library identifies a periodical article in your area of interest? Yes ☐ No ☐

(c) Please give reasons for your answer in 6(b) above

……..……

……..……

…….

7(a) Does your library give you printouts of articles on a subject of your interest?

Yes ☐ No ☐

(b) If no, would you like to get the printouts? Yes ☐ No ☐

8(a) Does your library help you to identify relevant information contained in periodicals held by other libraries? Yes ☐ No ☐

(b) If yes, how is this done ……
……..

(c) If no, would you like this service? Yes ☐ No ☐
……
……

(d) If so, do you sometimes require that the references be narrowed down to what you require?

Yes ☐ No ☐

(e) If yes, how do you get this done? ……
……..
……..
……..

9. (a) Do you require periodical articles specifying points of view and methodologies used in studies in periodicals? Yes ☐ No ☐

(b) Do you get this done? Yes ☐ No ☐

(c) If no, does your library assist you to narrow down to key articles only?

Yes ☐ No ☐

10. Please rate the sort of assistance you get from your library in the usage of periodicals

Excellent ☐ Good ☐

Minimal ☐ None ☐

11. Please comment on the quality of service accorded to you in using periodicals by your library

……..

……..

……

12. When you use references from indexes, abstracts, CD-ROM, etc, do you get all or most of the articles from your library? Yes ☐ No ☐

APPENDIX 5: SCHEDULE USED DURING PARTICIPANT OBSERVATIONS

1. Year (when the user was served)
2. Purpose (why the information was sought e.g. for 4th year project, Master's thesis, conference, paper writing a book etc)
3. Topic (title/topic or area where the information is sought)
4. Date of request (for article search)
5. Tools already used to search for information by the requestor (e.g. indexes)
6. Deadline (when information must be given)
7. Observation (include expressions and remarks noted)

(a) Articles given: Enough ☐ Not enough ☐

(b) Speed taken to provide references:

Fast ☐ Slow ☐

(c) Utility of articles given to the requestor:

Satisfactory ☐ Unsatisfactory ☐

(d) Convenience of search process:

Convenient ☐ Cumbersome ☐ Time consuming ☐

(e) Need for more articles/information from other libraries:

Commonly expressed ☐ Not expressed ☐

Evident although not expressed ☐

(f) Need for combining more than one concept to meet required specificity:

Commonly expressed ☐ Not expressed ☐

Evident though not expressed ☐

(g) Overall satisfaction observed:

User need achieved ☐ User need not achieved ☐

APPENDIX 6: CHECKLIST USED DURING DOCUMENT STUDY

1. Year (when the user was served)
2. Purpose for which information was sought e.g. For 4th year project, other (please specify)
3. Tools already used for information by the requestor (e.g. indexes)
4. Topic (Title/Topic or area where information is sought)
5. Date of request (for article search)
6. Deadline (when information must be given)
7. Name of the index (e.g. The Accountants' Index)
   - i. Articles given: Enough ☐ Not enough ☐
   - ii. Speed taken to provide references:
     Fast ☐ Slow ☐
   - iii. Suitability of the index/database as a retrieval tool/retrieval performance through browsing: Satisfactory ☐ Unsatisfactory ☐
   - iv. Convenience during use (of the index/database):
     Convenient ☐ Cumbersome ☐ Time Consuming ☐
   - v. Ability of the index /database to supply cited articles:
     High ☐ Reasonable ☐ Low ☐
   - vi. Exhaustivity of articles in a given area:
     High coverage ☐ reasonable coverage ☐ Low coverage ☐
   - vii. Up to datedness of the index/database:
     Less than 5 years ☐ Upto 10 years ☐ More than 10 years old ☐
   - viii. Ability to combine concepts/aspects/Viewpoints using the index/database:
     Possible ☐ Sometime possible ☐ Not possible ☐
   - ix. Consistency of the terms assigned in the index/database for retrieval purposes:
     Excellent ☐ Good ☐ Fair ☐ Poor ☐
   - x. Quality of search terms (predictability and accuracy):
     Excellent ☐ Good ☐ Fair ☐ Poor ☐

xi. Overall performance rating of the index/database for retrieval purposes:

Excellent ☐ Good ☐ Fair ☐ Poor ☐

APPENDIX 7: SCHEDULE USED DURING INTERVIEWS WITH PERIODICAL LIBRARIANS

1. On the average, would you say your library is able to provide sizeable periodical articles to meet user research requirements?
2. Using existing tools in your library, are you able to readily combine concepts/terms during searches to user satisfaction?
3. Are the periodical articles given to users within the required time frame?
4. Are the users satisfied with the quality and quantity of periodical articles given to them during literature searches?
5. (a) Which methods are commonly employed by library users to identify articles contained in periodicals held in your library?
   (b) Comment on the effectiveness of these methods.
   (c) What can you say are the shortcomings and strengths of the main method used to identify periodical articles in your library?
   (d) Would you describe methods used to identify articles contained in periodicals held in your library as convenient or cumbersome? Why?
6. In terms of speed, how can you describe the methods used to identify articles contained in periodicals held in your library?
7. Comment on the ability of your library to supply to users articles for references cited in published indexes?
8. Do you index your periodicals? Yes ☐ No ☐
9. Would you describe the ability of library to identify and supply articles indexed by your library as high or low.
10. Are you able to identify majority the relevant articles contained in periodicals held in your library during searches?
11. Comment on the possibility of a searcher combining a number of concepts during searches using search methods employed in your library
12. Is the need to combine more than one concept/term evident during searches?
13. Kindly comment on the quality and how fast you provide articles contained in journals held in your library collection

14. Do you describe the need for more articles from other libraries as commonly expressed by patrons?
15. Are you able to identify and obtain articles from periodicals contained in other libraries when needed by researchers in your university?
16. What is your opinion on the ability of your library to assist users get information contained in periodicals held in your library?
18. Suggest ways in which the identification and access to periodical articles can be improved to assist researchers using university libraries in Kenya.
19. In your opinion do you see the indexing of periodicals held in a library as necessary for maximum identification of relevant articles contained in periodicals held in the library?
20. Why do you think most libraries in Kenya do not index their periodicals?
21. Comment on the statement that “equal priority should be given to the indexing of periodicals as is given to the cataloguing of books if libraries are to provide effective service to University researchers”.

APPENDIX 8: LIST OF UNIVERSITIES IN KENYA USED IN THE STUDY

1. University of Nairobi
2. Moi University
3. Kenyatta University
4. Egerton University
5. Jomo Kenyatta University of Agriculture and Technology
6. Maseno University
7. Kenya Methodist University
8. United States International University, Nairobi, campus
9. University of Eastern Africa-Baraton
10. Catholic University of Eastern Africa
11. Daystar University
12. Scott Theological College
13. Africa Nazarene University
14. East Africa School of theology
15. The Nairobi Evangelical Graduate School
16. Kenya Highlands Bible college
17. Maharishi University of Management – Kenya
18. Nairobi International school of theology
19. Pan African Christian college
20. St. Paul's United Theological college Limuru

APPENDIX 9: LIST OF UNIVERSITY LIBRARIES USED IN THE STUDY

1. Jomo Kenyatta Memorial Library University of Nairobi
2. Lower Kabete Library University of Nairobi
3. Parklands Library University of Nairobi
4. Kikuyu Library University of Nairobi
5. Medical Library University of Nairobi
6. Chiromo Library University of Nairobi
7. Kabete Library University of Nairobi
8. Kenyatta University Library
9. IDS Library University of Nairobi
10. Moi University Library Main Campus, Moi University
11. Laikipia Campus Library Egerton University
12. Egerton University Main Campus library
13. Maseno University College Library
14. Jomo Kenyatta University of Agriculture and Technology Library
15. United States International University Nairobi Campus Library
16. Methodist University Library
17. University of Eastern Africa - Baraton Library
18. Catholic University of Eastern Africa Library
19. Daystar University Library
20. Scott Theological College Library
21. Africa Nazarene University Library
22. East African School of Theology
23. The Nairobi Evangelical Graduate School Library
24. Maharishi University of Management-Kenya Library
25. Nairobi International School of Theology Library
26. Pan African Christian College Library
27. St. Paul's United Theological College Library