

A SURVEY OF THE NEED AND SCOPE
OF COMPUTERIZATION OF LIBRARIES IN
KENYA

BY

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DECLARATION

THIS PROJECT IS MY OWN ORIGINAL WORK AND HAS
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DEDICATION

In memory of my late beloved father,
Mr. Eliud Muturi Miano, for his love
and encouragement.

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ABSTRACT

This study set out to determine the need for computers in libraries in Kenya, the image held about computers by library staff and to establish the extent of computerization in the country. The survey for the study was conducted between 7th April and 15th May, 1988.

The reviewed literature revealed that computers have alleviated problems of inefficient systems, eased the pressure caused by increased demand and work load and have enabled libraries to give new and varied services. It also indicated a trend towards cooperation and development of networks in an attempt to cope with the ever-increasing information in the face of increasing costs. The literature also revealed that computerization brings about a revolution in the library set up. It has implications for the whole fabric of the library. Being a growing technology it has its own drawbacks and pitfalls which should be taken into account. Hence there are varying opinions on computerization. The current study was aimed at finding out the Kenyan librarians stand on the issue.

The population of interest included all the libraries in Kenya except primary and high school libraries. The required information was collected through the use of a structured questionnaire. One hundred and two libraries completed the questionnaire and this provided the information used in this report.

The findings of the study suggest that the needs of Kenyan librarians are pressure of work, and the need to offer new services and systems that are slow, inefficient and cumbersome. Some libraries have turned to computers to satisfy these needs while others are in the process of doing so. The majority of the libraries, however, are still struggling with their manual operations and systems which were reported to be unsatisfactory in the sense that they are slow and inefficient.

Regarding the views held about computers by library staff it was shown that on the whole the image is moderate to poor, especially among the majority who fall in the non-computerized libraries category.

Concerning the extent of computerization, it was found that eleven libraries had implemented computerization. Most of these were special libraries. However, there are forty one libraries which have plans for computerization of some of their operations

and these fall in all the three categories, namely special, academic and public libraries. The functions which have been computerized or are planned for computerization by most libraries are information retrieval, cataloguing and periodicals control.

In conclusion, it was found that library cooperation in this area would receive overwhelming support.

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CHAPTER 1.

INTRODUCTION.

1.1 BACKGROUND

For over five hundred years the printed word has maintained a quasi-monopoly of the transmission and storage of information. It is only recently that this monopoly has been challenged by audio-visual storage of data and the computer both of which operate without the printed word. This challenge has come because of two reasons: first, it has become increasingly expensive to print books in the traditional way; second, the new generations of people are becoming more and more used to absorbing information and education through media other than the printed page (Thompson, 1977: 25).

Many of the libraries in the Western World are turning to computerizing their operations due to escalating costs of labour (Bhimani, 1986: 320; Library Association, 1982: 6). The rapid adoption of computer based systems in libraries and information centres has also been brought

about by a crisis caused by information explosion, rapid inflation and changing expectations of library users (Boss, 1979: 1-2). Thus information technology is having a big impact on management perspectives, service goals, organizational matters and on library housekeeping systems (McLean, 1986: 71).

The implementation of computerization is a major turning point because not only will it change the whole nature and approach of the library in the course of time but it is also a giant step toward the library of the future (Lovecy, 1984: 2; Bhimani, 1986: 322).

Computers have been used in libraries for only about thirty years. Automated systems did not really appear until about 1973 (Cart, 1987: 38). The new technology was first employed in libraries in technical and circulation control or in housekeeping operations and information retrieval (Tedd, 1977: 1-2). This is because these operations are the processes which lend themselves easily to computer application.

Initially computerization was implemented on an individual basis. With the development of on-line systems came the networks and cooperative systems. The latter developed because of the economies that accrued to the cooperating libraries. (Tedd, 1977: 3; Encyclopedia... 1968-1986: Vol.14. 341-342). This was and continues to be the period of general recession when budgets were declining and book costs were rising at a fast rate (Library Association, 1982: 6). The trend called for resource sharing of both bibliographical and financial resources. As a result, cooperative ventures are to be found in most countries where automation has been used in libraries (Plaister, 1975/76: 417; Tedd, 1977: 3).

1.1.1 Current and Future Trends.

It is old fashioned nowadays to talk of library automation and even more so of library computerization. The current term is "Information Technology" which by most definitions denotes a convergence of computing and telecommunications (Collier, 1987: 83; Eaton, 1982: vii). Over the

last fifteen years, that is, since the mid - 1970's, there has been a considerable growth of remote database access and the development of on-line systems.

The future for the library is seen as a focus of an information transfer centre. The reader is seen at a workstation comprising communication devices that will enable him to contact remote databases and databanks, accumulate references and factual data, check where the material is stored, and have relevant pages sent to the terminal by facsimile transmission, or for downloading into a personal database (Woods, 1986: 379-380; Koenig, 1987: 51-52; Marsterson, 1986: 56). The emerging picture clearly shows the possibility of bypassing of the traditional library and information services (Library Association, 1982: 16).

Thus if libraries are to avoid being bypassed, they will need to keep up with the new developments in information technology. They will need to be highly dynamic. New developments are a way of life in this field.

1.1.2 Need For Automation*.

Most libraries turn to automation for a number of inter-linked reasons (Tedd, 1977: 4-5). These could be to:

- manage a process more rapidly, more accurately or less expensively
- help overcome increasing library workloads
- offer new and improved services to users and library staff
- make use of external services.

Other secondary reasons which have been cited include:

- peer pressure
- pressure from above
- prestige
- "keeping up with the Joneses"
- a faith that "the future lies in automation". (Cart, 1987: 40; Lovecy, 1984: 1)

*The term library automation covers the automation of such activities as stock selection and ordering, accessioning, cataloguing and circulation. It also includes searching of files for bibliographical checking and stock location. The primary method of this automation is computerization (Library Association, 1982: 30).

Indeed, the new technology does lead to certain benefits. Its use results in:

- a) better and efficient services to library users and provision of new services.
- b) rapid performance of activities.
- c) freeing of staff from a large volume of routine work and increasing their overall productivity.

1.2 STATEMENT OF THE PROBLEM.

The decision to computerize any part or the whole of the library's operations is a major undertaking both financially and from the organisation's point of view (Boss, 1979: 3; Lovecy, 1984: 2). Computerization is but one way of solving a library's problems; a means to an end and not an end in itself (Boss, 1979: 4). Therefore, a library must be careful to define its problems and evaluate all the available alternatives.

Most of the literature which the current researcher has reviewed indicates that computers have alleviated problems of:

- . systems that are slow, inefficient, cumbersome and ones that are unable to cope with increased demand.

- . staff being unable to cope with increased workload.
- . libraries that are unable to offer new services because of routine jobs.

The literature also conveys the impression that there are no options to computerization. For instance, Woods (1968: 8/9/86) says that "if you do not computerize, the organization (and the country) will drop behind those that do". While Jones (1982: 63) contends that "many ... ideas (though) potentially valuable, work well only in appropriate organizational and managerial environment ... they cannot simply be bolted on".

There have been a few studies which have looked at specific aspects of computerization in academic libraries (Were, 1985; Matanji, 1986; Mulwa, 1987). To the writer's knowledge, no study has been carried out to establish the need and scope of computerization in libraries in Kenya. The purpose of this study, therefore, is to narrow this information gap.

1.3 OBJECTIVES OF THE STUDY

The objectives of this study are threefold:

1. To identify computerization needs of libraries in Kenya.
2. To investigate the perceived image of computer applications in libraries in Kenya, and
3. To determine the extent to which libraries in Kenya have computerized.

1.4 IMPORTANCE OF THE STUDY

It is hoped that this project will be of value to the following groups of people and/or institutions:

1. To the libraries which are currently planning and those implementing computerization in their libraries as well as those which will be doing so in the near future, this study will indicate the issues that need to be taken into account in their planning process.
2. The library profession as a whole and the Kenya Library Association in particular in planning for future developments and in formulating their policies.

3. Policy makers, in particular parent organizations in designing policy guidelines for their libraries.
4. To the academics the study will add to the body of knowledge on management of computerized library services. The findings may also form a basis for further research.
5. To the marketers this study will reveal the market potential for both hardware/software and services.

1.5 RESEARCH SETTING.

Libraries and librarians have their origin in antiquity. They have been around for more than twenty five centuries (Thompson, 1977: 9). The greatest library of antiquity, the Alexandrian Library was already flourishing two hundred years before the birth of Christ. It was the greatest library before the invention of printing. At one time it was said to have held over seven hundred thousand scrolls (Johnson, 1970: 58; Jackson, 1974: 13). Before the Alexandrian library was established

there was a major library at Nineveh (668 B.C. to 626 B.C.). This library had thirty thousand clay tablets which was as comprehensive and well-arranged as any equivalent national library of modern times (Thompson, 1977: 20).

These great libraries disappeared with the fall of the Roman Empire. Between this period and the middle of the fifteenth century when printing was invented, libraries were to be found only in monasteries. These held manuscripts on parchment codices.

Libraries are first and foremost stores of knowledge. They have had a virtual monopoly of the storage of human knowledge. Other purposes of libraries are only ancillary to this storage role and relate to the use made of that knowledge (Thompson, 1977: 88; Marsterson, 1986: 11-28).

Strict adherence to this role has made libraries myopic in the face of new trends and technologies (Library Association, 1982: 15-16). For instance, the library profession failed to respond adequately

to the needs of the professional researcher who emerged between 1920 and 1960. As a result a group hived off from the profession to form their own organization - the information scientist - to satisfy this need. In 1950s and 1960s there was need for community based information services brought about by the growing complexities of everyday living. As before, the profession did not recognise this need and others such as Legal Advice Centres and Consumer Advice Centres stepped in to fill this gap. The trend in the 1970s and 1980s is one of greater demand for non-print media. If libraries do not respond to this need, others will as it has happened in the past.

1.5.1 Kenyan Scene.

The earliest libraries (Muriuki, 1984: 39-41) in Kenya were developed separately for the different communities, namely, Europeans, Asians and Africans, with the quantity and quality following the same order. Some of these libraries were established at the turn of the century. These were mainly government libraries but

others were established by individual philanthropists or groups of public spirited people. Collections in educational institutions did not appear until the latter half of the 1950s. Specialised libraries were founded in various research institutions and government institutions. In some cases, these were favoured with sufficient funds to allow them to build up excellent collections in their subject area of specialization. Not only did these early developments make significant contributions but they also laid the foundations of the present library system in Kenya. Consequently, the highest number of libraries fall in the special libraries category followed by academic and finally public libraries. The latter two include the two largest libraries in Kenya; namely, the Kenya National Library Services and the University of Nairobi Library.

A few of these libraries* are at different stages in their plans and programs towards the computerization of their library and information services (see Appendix III). The general trend, however, is in information retrieval. Such libraries as UNEP (United Nations Environment Programme), HABITAT (United Nations Centre for Human Settlements), ICRAF (International Council for Research in Agroforestry), ILRAD (International Laboratory for Research on Animal Diseases), ICIPE (International Centre for Insect Physiology and Ecology) and the American Cultural Centre have automated systems and give information service relating to their area of specialization. UNEP'S INFOTERRA is an environmental information system which operates in one hundred and twenty six countries of the world. The Kenyan focal point for this is the Ministry of Environment and Natural Resources situated at the Kenyatta International Conference Centre. ICRAF also

*This information was gathered by the current researcher during her visits to the concerned libraries.

uses its microcomputer for production of publications. Its catalogue is also computerised. The Kenya Technical Teacher's College has an automated in - house acquisitions system which is also used to control the library's accounts. Both Kenyatta University Library and the Kenya Polytechnic Library have installed anti-theft electronic systems.

Other projects are at the planning stage. These include the Kenya National Library Services project for producing the Kenya National Bibliography and the University of Nairobi Library automation project. The latter is at a very advanced stage. It is being planned by two committees which are working closely together, the University Library Automation Committee which was appointed by the Vice-Chancellor in November 1986 (Library Automation Committee, 1986) and the Library Automation Committee. The former is a University level committee while the latter is at the library level. A feasibility study was in progress at the time of writing (Library Automation Committee, 1987).

The institutions which have progressed furthest in automation are international in character. The major problem that the local effort is likely to face is poor telecommunication in the country.

It should be noted, however, that computers are not new to the country. There have been large mainframe computers in government and commerce for many years (Taylor & Obudho, 1977: 27; Scott, 1971: 86). As noted above it is only recently that there have been some beginnings of their application in libraries. Computerization of library operations in Kenya is very much in its infancy. However, a lot of interest in automation has been generated and investigation of what is happening in this field is the rationale for this study.

1.6 PLAN OF THE MATERIAL IN SUBSEQUENT CHAPTERS.

Chapter two gives a review of the pertinent literature relating to the study. The reviewed literature covers the history of automation, evolution of networks and co-operative systems, current and future

trends of computerization, the need, benefit and implications of computerization in libraries. Finally, it reviews the risks and problems of computerization.

The third chapter deals with the research procedures followed in this study. The discussion in this chapter centres on a definition of the relevant population, data collection method and data analysis techniques.

The fourth chapter discusses data analysis and interpretes the findings. The fifth and final chapter presents a summary, conclusions and presents some recommendations. It also highlights the limitations of the study. Finally, the researcher outlines some suggestions for future research.

CHAPTER 2.

THEORY OF COMPUTER APPLICATION IN LIBRARIES.

2.1 HISTORY OF AUTOMATION

The idea of automation came from a librarian, John Shaw Billings the then director of Surgeon-General's library* (Dictionary of American Biography, 1944:415). He suggested to Herman Hollerith of the Census Bureau, that there should "be a machine for doing purely mechanical work of tabulation and similar statistics" (Encyclopedia ... 1968-1986: vol.14, 338). Hollerith followed up this suggestion and by 1890 he invented an equipment to do just that using punched cards. In 1896 he formed the Tabulating Machine Company, the forerunner of International Business Machines Corporation (IBM).

However, librarians did not adopt this new technology in any big way and up to the 1950s there were only scattered instances of mechanized systems in libraries. In the late

*This was the forerunner of the National Library of Medicine in the United States of America.

1950s and early 1960s more systems were installed but only in small specialized libraries. These used punched card equipment. Computers as we know them today were not used in libraries before 1961. The reason for this was that computers were assumed by most people to be appropriate only for numerical work. At this time, also, computer programmes were still oriented toward business and scientific applications. Thus libraries lagged behind business, industry and science in this respect.

The 1960s ushered in the next stage of development of library automation. There was wider use of general purpose computers which, though they used punched cards for input, could store information on magnetic tape and transfer automatically such information in and out of the computer's "core". In addition to this, the operations and the capacity for manipulation and analysis of data were at a phenomenally increased speed. The impetus on computer use was increased by society's realization that computers could be used effectively for non-numerical work and the use

of computers in libraries followed. As one writer put it "a library is a place for storing knowledge under a system that facilitates identification and retrieval as needed, which is also a definition of a computer" (Library Journal, 1968: 711).

Following on the above developments, library automation projects increased in the early 1960s among which were the National Library of Medicine's mechanization of medical literature (Encyclopedia ..., 1968-86: vol.14: 394); the University of California at San Diego's work on serials control; and the Southern Illinois University in Carbondale's landmark circulation system. In 1963, the University of Toronto began to produce computerized book catalogues for five new University libraries. In the same year, the King Report on "Automation at the Library of Congress" (LC) was published setting out the feasibility of automating many of the activities of the Library of Congress (Rohrback, 1985:9). This culminated in the setting up of Project Machine Readable Cataloguing (MARC) at the LC. This has had so great an impact on library automation to this day that it warrants separate treatment later on.

Most of the computerized projects up to this point were off-line, batch-processing systems. On-line systems for library related purposes started at Massachusetts Institute of Technology (MIT) with its experimental on-line time-sharing systems in 1965. This was soon followed by the Ohio College Library Center (OCLC), another landmark, and Stanford University's BALLOTS (Bibliographic Automation of Large Library Operations Using Time Sharing System)*. Both of these were designed to access cataloguing records available on Project MARC plus additions from other libraries. The following year witnessed the addition of other on-line systems for circulation, serials control and acquisitions systems (Encyclopedia ..; 1968-1986: vol.14, 342).

These developments were not confined to North America but were also taking place elsewhere. For instance, in the United Kingdom (UK) the public libraries of Camden and West Sussex and the University libraries of Newcastle and

*Now Known as RLIN (Research Libraries Information Network) (Hunter, 1985: 170-172).

Southampton were also involved in the experimental phase (Tedd, 1977:3). The experimental phase in turn evolved into the current period of on-line systems which have enabled the development of networks and cooperative systems as discussed here below.

2.1.1 Machine Readable Cataloguing (MARC)

Centralised cataloguing has been advocated ever since the time of Melvil Dewey in 1877 when he argued for it as a time saving device and also for cutting down on duplication of effort (Encyclopedia..., 1968-1986: Vol.14, 144, 148).

As mentioned earlier, MARC resulted from King's report in 1963. The report had concluded that the bibliographic system of LC could be automated in ten years. The conversion was enabled by a grant from the Council of Library Resources and with it came the development of a pilot operation for the distribution of machine readable catalogue data on tape to a representative sample of libraries in the United States of America. These were national, public, academic, school and special libraries. The

format of the data was closely linked to that of LC catalogue cards.

By the end of 1966 there were sixteen participating libraries and by the time the pilot project ended in June 1968, fifty thousand records of English language monographs were distributed to these libraries.

The original format had been found inadequate and with the collaboration of the British National Bibliography (BNB) a new format known as MARC II was designed (Tedd, 1977: 51). The aim of this format was to communicate a bibliographic description on magnetic tape which was flexible and which would be capable of being re-formatted for any conceivable purpose. This became operational in 1967 (Hunter, 1985: 32).

The use of these tapes spread like wild fire both in the United States of America and the United Kingdom. For instance, between 1968 and 1974, twenty libraries in the United Kingdom alone were receiving them. The library of Congress did not start distributing these until 1969. Up to this point, records were for current materials only. A need was, therefore, felt for

the whole stock to be in the new format and this gave rise to Retrospective Conversion (RECON) in 1970 which was based at the Library of Congress. In the United Kingdom, a retrospective file of MARC records had been built up by BNB covering the period from 1950 to 1974 (Tedd, 1977: 51).

These developments have had great impact on the cataloguing and classification practices in libraries; so much so that MARC format has been adopted in many countries including France, Canada, West Germany, Japan, Italy, Belgium, Denmark, Holland, Ireland, Sweden, Australia and South Africa (Tedd, 1977: 53; Hunter, 1985: 36).

Besides their use for cataloguing and classification, the tapes are used for selection, ordering, selective dissemination of information and co-operative service. MARC can also be accessed online and the system is the basis of many library networks (Hunter, 1985: 36).

2.1.2 Online Computer Library Centre Inc. (OCLC)*

OCLC is the largest best known and most influential system on library practice in the United States of America after the Library of Congress MARC especially in the area of shared cataloguing (Encyclopedia ..., 1968-1986: vol.14, 374-375).

OCLC grew out of a recommendation by Frederick Kilgour and Ralph Parker who had been invited as consultants on the setting up of a bibliographic centre for Ohio, USA, academic libraries. They suggested a computer - based system which was established in 1967 as OCLC, a not - for - profit organization, with over sixty academic libraries (Hunter, 1985: 169; Clayton, 1987: 119, 210). The aim of the project was twofold: to share resources between individual libraries and to reduce the rate of library costs. It was planned to eventually integrate cataloguing, circulation control, inter-library lending and access to the data base. This data-base had MARC records as its main source. The

*Originally known as the Ohio College Library Centre and located at Columbus, Ohio. There have been two name changes, in 1977 and 1981, to reflect its national and international growth (Hunter, 1985: 169).

first computerized service became operational in 1970 with batch processed MARC - based monograph cataloguing system. This was replaced in 1971 by an online remote access system which led to considerable expansion.

OCCLC is no longer limited to academic libraries in the state of Ohio. It now serves over five thousand libraries and institutions in and outside the United States of America (Freedman, 1988: 3; Hunter, 1985: 169).

2.2 EMERGENCE OF NETWORKS AND COOPERATIVE SYSTEMS IN LIBRARIES.

Library networks are formed when two or more libraries and or other organizations engaged in a common pattern of information exchange, through communications, for some functional purpose, come together. (Samuelson et al, 1977: 79-83 and Boss, 1979: 24-26). A network usually consists of a formal arrangement whereby materials, information, and services provided by the cooperating libraries are made available to all potential users. On-line networks enable libraries to know quickly and efficiently which books are in other libraries enabling them to share materials and to reduce

duplicate copies purchased. Bibliographic data can be shared more effectively, too, as the OCLC system demonstrates. There are two main advantages of networks, namely, the possibility of sharing and giving additional core storage or occasionally software and application programs; and the fall-back possibilities and increased reliability.

Networks saw their beginnings in the 1970s when there was an increase in co-operation and resource sharing by libraries which were developing computer based systems. Some of these have even become formalized library networks.

Such technical developments as improvement in communications between computer systems and system users as well as between libraries have made network trend possible. With on-line networks it becomes feasible for many libraries to literally share the same working files and catalogues in real time. The same technology has lowered the cost of storing units of data and the cost of on-line terminals has also declined while labour costs have continued to rise (Encyclopedia..., 1968-1986: vol.14, 413-45).

The United States led the world in networking with the major networks being OCLC, RLIN (mentioned above) and Washington Library Network (WLN). Other countries such as the United Kingdom, Canada, Australia, Netherlands and Sweden followed suit (Hunter, 1985: 177-189). A few of these are reviewed next.

The formation of the British Library and the British Library automated Information Service (BLAISE) have been probably the most important events in library co-operation in England (Hunter, 1985: 177-178). It brought together the former British Museum Library, the National Reference Library for Science and Invention, the National Central Library (NCL), the National Lending Library for Science and Technology (NLLST) and the British National Bibliography (Plaister, 1975/76: 417). This makes the British Library a national library to rival any in the world. The British Library operates three divisions, namely, the reference division, the lending division and the bibliographic division. The latter is charged, among other things, with processing of acquisitions of the British Library and the development in the United Kingdom

of a computer based system for storing and handling of bibliographic information for use by libraries. This library offers the British Library MARC service to other libraries. The MARC service consists of retrospective and current UK MARC file, 1950-74 and 1975 - to to-date respectively. It also contains retrospective and current LC MARC files covering 1968-74 and 1975 to to-date (Plaister, 1975/76: 417).

There are other developments in library cooperation and among these, the most notable is the Birmingham Libraries Co-operative Mechanization Project (BLCMP) (Tedd, 1977: 60-62).

2.2.1 Birmingham Libraries Co-operative Mechanization Project (BLCMP).

BLCMP was started in 1969 and it was the first co-operative automated cataloguing service in the United Kingdom which was formed to provide services for the libraries of the Universities of Aston and Birmingham and for the Birmingham Public library (Clayton, 1987: 209); Hunter, 1985: 178-180). It was started in the hope that it would increase the range of possible services and that it would minimize costs by pooling of resources.

As of 1984 BLCMP was supplying cataloguing services to libraries from various parts of the United Kingdom. The data base for BLCMP is quite comprehensive and includes a back file of UK MARC to 1950 and LC MARC to 1972 records plus the file of locally produced MARC records (Tedd, 1977: 60-62).

2.2.2 South West Academic Libraries Cooperative Automation Project (SWALCAP).

An interesting development in academic co-operation is the South West Academic Libraries Co-operative Automation Project (SWALCAP) (Tedd, 1977: 108-109; Hunter, 1985: 180-181). Like BLCMP, it was started in 1969. It incorporates the libraries of the Universities of Bristol, Exeter and University College, Cardiff. This uses a central library computer with the cooperating libraries being linked on-line for their circulation, cataloguing and acquisitions systems.

The trend towards networks and co-operative ventures has picked momentum because they are economically attractive. And because of this advantage, many libraries might opt for this approach in the future.

2.3 LIBRARY AUTOMATION

The term "automation" in its narrow sense applies to automatic process control. Indeed this was the meaning attached to the term when it was first used. In its broader meaning, "library automation" is commonly used for mechanisation of library activities using data processing equipment (Encyclopedia... 1968-1986: vol.14, 338).

When faced with automation, the first question to be asked is whether it is worth it. In other words whether it is really sensible to spend a vast amount of time, money and energy on replacing a system that currently functions acceptably, the net effect of which will be to reduce the demand for labour even more. But there are strong pressures driving the movement along towards increased automation as will be shown below. (Eaton, 1982: 214-216). The next question concerns what one is trying to achieve by automation. Automating individual activities will show short-term gains but may not help towards an overall solution (Eaton, 1982: 216-220).

2.3.1 Need For Automation in Libraries.

Most libraries especially those of higher learning institutions are plagued with the problem of keeping up with the increasing rate of growth of information. Coupled with this has been the increased number of users with varied needs. As a result manual systems have been unable to cope.

Among the materials maintained by a library only a relatively small number of items have a high turnover. Solving this problem calls for operation of short loans and a reservation system. This is usually slow and frustrating to both users and staff. The need for computerization, therefore, arises from many pressures which have been mentioned by many authors including Rowley (1985: 3-4) and Clayton (1987:1). These pressures are:

- a) Problem with existing manual system which knowledge and experience tells the librarian might be solved by automation.
- b) Increased workload.
- c) Need for greater efficiency.
- d) Need for new services.
- e) Cooperation and centralization.

f) Demand from users.

Other pressures are:

- g) Desire to be fashionable or to achieve personal or / and institutional kudos which installation of a computer can bring, and
- h) Sudden windfall.

Thus the needs which can be satisfied through the use of the computer are many and varied and may differ from library to library and from country to country.

2.3.2 Benefits of Automation.

Most libraries which have turned to the use of computers have used them for their housekeeping and information retrieval processes. This is because they foresee certain benefits accruing to them over their manual operations. A computer is a tremendously powerful and willing servant. Some librarians view computers as "slavish to handle the 'dog-work' at the reference desk, but others look to this new development to explore new mental frontiers" (Library Journal, 1987:44).

The operations that readily lend themselves to automation at the present time are clerical tasks. Because of the superb flexibility of the computer, it is possible to compile lists by

author, subject, title, series, language, publisher or any other way. Indeed the limit to these possibilities is the imagination of the system designer, the librarian, or the data itself. More specifically, the advantages as mentioned by such authors as Hammer (1965: 20, 44), Tedd (1977: 4-5), Butler (1979: 12-23), Becker and Hayes (1970: 109) Koutz (1979: 157-167) Library Association Report (1982: 19) and Rowley (1985: 1) include:

1. Access by multiple users for:
 - a) the acquisition function of searching and claiming for outstanding orders.
 - b) Circulation: in printing overdue notices, discharging books, making reports on unpaid overdues and printing many other lists.
 - c) reference - in printing bibliographies, maintaining up-to-date location of every book and for information retrieval.
2. A variety of useful statistics are available with no effort on the part of the library staff for the functions of cataloguing, reference, circulation and acquisitions departments as well as for general

management in forecasting budget needs and costs, collection management, estimating future supply needs, checking on rates of expenditure and in inventory control.

3. Computerization saves staff time and relieves them of repetitive chores thereby improving accuracy and integrity of files. The rate of performance is at such a high speed that unit costs of work are reduced. Records are not only more accurate but also more accessible and the work flow is more rapid and more systematic thus achieving greater efficiency.
4. The advantages can also be far - reaching.
One of the many elements in computer programmes is the availability of external data which can be exploited to greater effect on a computer system. The other is that centralisation and availability of data, the ability to share records and some of the burdens of planning and designing a system greatly eases the problems of housekeeping operations.
5. A sensible introduction of new technological developments can give a library or information service a better chance of succeeding in its primary aim of providing appropriate, up-to-date information at the right time and right place.

6. Automation ultimately benefits the end user by improving the range and quality of user and support services.
7. It will facilitate extended and higher standards of service with better control improved efficiency and higher productivity. In addition it permits fuller and wider cooperation between libraries and information services.
8. A well designed library system can provide up-to-date management information on the use of services resulting in more effective allocation of staff and other resources.

However, computerization should not be viewed as a panacea for all library problems but rather as a pressure reliever, a tool and a means to an end. It should be borne in mind that a computer system, or indeed any system, is as good as the human beings who design, implement and operate it.

2.3.3 Impact of Automation in Libraries.

The pressures that led to the adoption of automation in libraries in Western Countries are soon, if not already, going to be felt in developing countries including Kenya.

If automation is envisaged as in the case with the University of Nairobi library and a few others (see appendix III), there are certain implications of automation that need to be borne in mind. The most important concerns personnel and comes by way of fear of change. This is very common in human nature but it is more so where computers are involved (Axford, 1979: 171). This fear arises from personal conflict, prejudice and ignorance. Other authors have mentioned that people fear that jobs will be taken over by machines. (Spyers-Duran, 1979: 33; Lovecy, 1984: 150; Library Association Report, 1982: 38). This is founded on the fact that efficiency through computer means better quality of work with less staff. Computers do indeed replace people in certain tasks of the system - such as in housekeeping tasks (Lovecy, 1984: 150-151). In libraries this releases staff from housekeeping routines to other areas where computers cannot be used. Such areas include user education, literature search for users, current awareness, translations, book reviews, dissemination of information, and so forth. Therefore, these fears should be

allayed by assuring staff that their jobs are not going to be taken over by the computer but that the tasks may change. Some routines do indeed remain even after the implementation of computerization. Experience shows that on the whole, staff requirements are not reduced (Boss, 1979; Lovecy, 1984: 151). However, in some departments such as in cataloguing, reduction does occur (Spyers-Duran, 1979: 35-37). The reasons for non-reduction of staff overall are to be found in the nature of work. Human interaction or intervention is necessary at different stages of library operations. As well as this, library work itself is intensive. It is important, therefore, to take into account such possible reactions when considering automation.

2.3.3.1 Technological Impact.

Libraries in Kenya, like their counterparts elsewhere, operate on reduced budgets (Axford: 1979: 179; Library Association Report, 1982: 18). Stable or declining budgets force libraries to concentrate on real rather than ephemeral issues that require bold decisions. Consequently, librarians in Kenya will need to adopt and seek

technological developments that are appropriate if they are going to continue providing adequate services. Application of these technologies may result in a greater range of services as well as availing information useful for the management process.

The greatest impact of technology is that it has propelled the profession from isolation to interdependence (Axford, 1979: 172). Technology will enable the achievement of the primary aim of providing appropriate, up-to-date information at the right time and at the right place.

When libraries automate, hardly any aspect of its operations escapes its impact (Lovecy, 1984: 2). The staff ratio of professionals to support staff and the levels of such staff are effected (Library Association Report, 1982: 37). This is because there is a need for new skills which are not traditionally associated with the profession including skills such as electronics, systems analysis and computer programming.

It becomes necessary to adapt both the personnel and the operations for them to be compatible with the computer. This entails

substantial changes in duties as compared to those for which they were originally employed. Staff may find that their existing skills are no longer appropriate to the new environment (Library Association Report, 1982: 37).

There have also been changes in publishing practices (Library Association Report, 1982: 19). At times publishers may not publish their announced forthcoming titles if not enough orders are received (Boss, 1979: 36-43). It means that the acquisitions departments have to be quick in ordering. Other developments are the electronic publication of primary material, videotext and viewdata (Boss, 1979: 42-43; Library Association Report 1982: 19-20). This means that those libraries which have not automated will not be able to use this type of material.

Historically, the communication tool which has attained dominance between the library and its users has been the card catalogue. With automation this is all changing to COM* catalogues or to on-line access to the data base. Spyers-Duran (1979: 29-39) among others, views the major

*COM stands for computer output on microfilm.

implications in cataloguing as:

- a) Freedom from constraints of formal cataloguing.
- b) Efficient operation of data.
- c) Improved subject access.
- d) Provision of data base or access to other data bases by service industries outside the profession.

In summary, the rapidly changing computing and communications technology presents library administrators with big challenges. Librarians are finding themselves at a threshold where they have to decide whether to automate or to remain manual bearing in mind the major implications of such decisions.

2.3.3.2 Economic Impact

The decision to automate is a major capital investment. The costs do not only include initial capital outlay for the equipment and space but also includes costs of consumables, database, computer time and maintenance.

Actual costs of automating a particular library system can only be determined after decisions on type of system to be used are made. Prices differ according to supplier, type of hardware, software, processing power, storage

capacity, peripherals and so forth. Many authors have concerned themselves with this aspect among whom are Tedd (1977: 179-181), Butler (1979: 8-10), Luker (1975/76: 655-659) and Lovecy (1984: 122-125). It would appear that, in the short run, costs in general are higher than in manual operations. This would be more so for Kenya because the equipment would have to be imported. Published figures vary widely but, as an example, Were (1986: 25-26) estimated that in 1986 the initial cost plus the running cost for a micro-computer for one year for the Main Library of the University of Nairobi was K£58,250. And for a minicomputer this came to K£176,000. The point being made here is that costs associated with computerization are a good proportion* of the library's budget (Lovecy, 1984: 122).

*Proportions of between 4.62% and 7.42% of gross expenditure have been quoted (Library Technology Centre, 1987: 17). This is only a rough indicator as accounting systems vary enormously and in most cases they do not include staffing costs associated with library automation.

According to Clayton (1987: 224-225) costs of automation fall into the following categories:-

- a) Systems personnel costs, including time for systems design, programming and program testing.
- b) Library personnel costs, including time for participating in systems design, study, training and establishing new procedures and maintenance and including costs of converting the files.
- c) Equipment costs, including costs for computer time and other computer associated equipment such as microfiche readers.
- d) Material costs such as paper, forms and so forth. This particular cost peaks at the implementation phase.
- e) File creation (capturing data and entering) costs. This operation may require extra staff, especially at the early stages if RECON* is envisaged.
- f) Miscellaneous costs. These include communication charges, legal fees, consultants' fees, costs for systems modification, review or expansion. It is stressed that a thorough understanding of these costs is imperative.

*Retrospective conversion of the catalogue.

Financing of automated systems especially for Kenya should be viewed not in isolation but as an investment for future library services. This will be in the sense that libraries are facing growing collections which are increasingly more expensive to store, organize and avail. These costs are increasing yearly because of rising prices. The situation is made worse by the fact that libraries are allocated low percentages of their institutions budgets. This is as a result of libraries being given low priority in the face of inflation. Consequently there is need to automate to maximize usage of collections and to be able to link up with other data bases.

As Boss (1979: 3) has asserted, though automation is an expensive exercise, failure to consider automation may end up being the most costly error of a library.

2.3.3.3 Psychological Impact.

Automation brings changes that may give rise to anxiety, trauma and a sense of alienation (Axford, 1979: 171; Lovecy, 1984: 153-154). This is because without automation, work organization is structured, ordered and stable and its pattern is predictable.

Changing such a situation can only mean difficulties for those involved (Taylor, 1967; Lovecy, 1984: 150). Disturbing such a pattern makes personnel anxious. It also means that they have to change attitudes which are deeply rooted in emotion and canonized by tradition.

Elsewhere in the library automation means changing work routines. It means learning new skills which some employees may find beyond their capability and may even opt to quit or retire (Spyers-Duran, 1979: 33-34). In general people do not like changes; but institutions and people have to change. If change is properly introduced, it can be smooth. It is necessary to indicate to staff the benefits of such a change to forestall resistance. As one author puts it, psychological satisfaction can be achieved by the system's roles and tasks that are designed so that

"The individuals may experience a higher degree of psychological success, confirmation and essentiality" (Argyris, 1970: p.47).

The same advice is given by Lovecy (1984: 154-155) and by the Library Association Report (1982: 37). If staff involvement is overlooked,

then social discord, job dissatisfaction, loss of self esteem and prestige may result. Therefore if problems are anticipated, it is advisable to introduce the changes one step at a time to minimize such problems (Spyers-Duran, 1979: 184).

2.3.3.4 Social Impact.

Automation brings about changes in the recurring tasks as mentioned above. Some of these tasks may be completely automated while others may be semi-automated (Lovecy, 1984: 150-151). This implies changes in the working environment and work habits. The impact on the social set up spreads throughout the whole structure and not just to some levels (Eaton, 1982: 266-275).

Changes also occur in work assignments resulting in expansion of duties and a greater independence for those who work on computer terminals (Spyers-Duran, 1979: 31). More interpersonal issues are likely to arise among supervisors, peers, professionals and support staff. Occasionally conflicts may develop because the staff who cannot or will not accept automation become hostile towards those who do. Thus a truly cooperative effort is required if

desired goals are to be attained. This may in turn require putting personal feelings in their proper perspective.

To minimize the negative ramifications of the social set up, automation should, in general, be introduced in three phases. The first should be to instill a need for automation; the second, training and implementation of the system; and the final phase should be to introduce the system to the users.

Thus when automation is deemed to be the answer to a library's problems and needs, there are many benefits that can be expected. At the same time both negative and positive influences on the whole system which can have far-reaching implications should be expected and, what is more, planned for.

2.4 MANAGEMENT OF COMPUTERIZATION IN LIBRARIES.

The decision to make a major capital investment in automation and the organizational changes that go with it can be highly political (Boss, 1979: 3). Some people may feel that their jobs are threatened while others may resist a re-allocation of resources. There are many who like the traditional library of

books and journals and who will resist attempts to change it even in the face of a crisis. Yet the decision to automate one or more functions of a library is one of the most exciting and challenging endeavours to confront administrators and technical service personnel (Kimbrough 1979: xi).

However it is also a very frustrating undertaking. But once the job is done, it can be a satisfying accomplishment in a librarian's career.

2.4.1 Planning.

The decision-making process for automation is spread over many months, possibly even years and involves many people at many levels both within and without the library (Bagley and Oyston, 1982: 8-31). The events that take place during that time inevitably shape the final outcome. The planning process involves decisions on equipment, costs, staffing and preparation for automation.

There is a plethora of literature on this aspect and authors such as Tedd (1977: 37-49), Boss (1979: 45-52), Spyers-Duran (1979: 29-39), Lovecy (1984: 150) and Rowley (1985: 8-21) are

but examples. The first step in planning is to set the objectives and to define the problems carefully. All available alternatives should be identified and evaluated. The librarian should be careful not to mistake the "symptoms" for the "disease".

In selecting equipment there are five options open to the library (Rowley, 1985: 4-5; Hunter, 1985: 132-155):

- (1) Acquiring a turn-key stand-alone system.
- (2) Doing the project within (in-house) the library using stand-alone mini or mainframe computer.
- (3) Contracting for a commercial turn-key distributed system.
- (4) Utilizing the mainframe computer of the parent organization.
- (5) Contracting with a library network to provide the service.

Each of these alternatives has advantages and disadvantages (Boss, 1979: 5-8). The next consideration is assessment of costs. These vary with the accuracy of data required. Libraries have large and complex bibliographical files but only a small percentage of the file is

consulted in a given day. Becker and Hayes (1970: 109) estimate this to be as little as 0.1%. This is in sharp contrast to the activity in many business organizations where much smaller files may be consulted many times per day. Although prices are coming down with new technological developments as well as reduction of costs of performing a single task, total operating costs may rise because more work is being done (Boss, 1979: 3). This is caused by what Atkinson calls "a vast reservoir of unmet needs" (Atkinson, 1975: 587). Many libraries, recognizing the enormous cost and the planning involved have aligned themselves with regional set ups for increased efficiency (Byrn, 1969: 520-530). The decision to automate, therefore, is not determined by cost alone but also by the expected improvement of services.

Staffing is the next area of consideration in planning. There are three options open to the library, namely, using the library's own staff and training them, employing a computer expert, and using an external organization (Tedd, 1977: 47). Whichever alternative is chosen, the total number of people involved in the analysis and implementation vary with the

complexity and time scale of the project (Tedd, 1977: 46). At the very least, there should be a computer person and a member of the library staff working full-time on the project. Other staff members may be employed as and when they are required.

It is important to give staff consideration its due weight because staff is the most important aspect of any library operation. Staff can be the cause of success or failure of any system.

An analysis of the library's operations needs to be done. There is a lot of literature on the techniques of analysis of the operations and their costs and Boss (1979: 47) and Lieberman (1982: 98-122) are only but two of the examples. When the record format and file structures have been decided upon, the library needs to start converting its records to the appropriate form and format. This can be achieved in any of the three ways (Tedd, 1977: 43-44).

1. Records bought from an external agency.
2. A bureau is used to convert manual records to machine readable form, or
3. The records are converted within the organization.

Each library should survey its own needs and wants to determine the best configuration of machines to accomplish its aims with the lowest costs.

2.4.2 Implementation.

Implementation involves procurement, installation of the system and the selling of the program to staff and users. Having decided to automate, a library is ready to procure the system. The selected equipment should fit in with the library's performance specifications (Boss, 1979: 53; Lieberman, 1982: 147-149). A vendor is then selected with whom a comprehensive contract should be drawn.

Planning for installation should take place well in advance. Both Tedd (1977: 41) and Clayton (1987: 154-156) have suggested several methods that can be adopted. These are:

- a) Complete changeover whereby the old system is replaced directly by the new system on a specified day.
- b) Phased approach. Here the total system is divided into sections and automated one at a time.

- c) Paralled running - both systems are operated in parallel for a period of time until the new system works satisfactorily.
- d) Pilot operation - the system is installed in a smaller and less busy branch before being installed in the main library.

2.4.2.1 Staff and Staff Training.

For the system to be successful, many authors, for example, Tedd (1977: 44-47), Lovecy (1984: 154), Library Association Report (1982: 37) and Rowley (1985: 10-20) emphasize the psychological need to keep all library staff adequately and accurately informed about the introduction of a computer - based system from the beginning.

The training programme for staff should be carefully planned as staff are, in many respects, responsible for the success or failure of the new system. The training should not be a once and for all happening but a continuous one. Information requirement by staff will differ with the level and the amount of involvement with the actual computer. Those involved with operating the new system would

need more specific training. Sometimes the vendor may supply this when installing the equipment.

2.4.2.2 Education and Training of Users.

Most people do not naturally accept computer systems. The manner in which computers are introduced will determine the type of reaction that users will have.

Users need to be told about the new system especially if it is going to directly affect them (Lovecy, 1984: 218; Herring, 1986: 30). For instance, if the library is planning to install COM catalogue or if the search is going to be on-line or a new charging system is planned, the users will need to be informed. As Tedd (1977: 45) succinctly puts it, any new service offered to users should be well advertised because in any case the change is intended to better the service to them.

There are several approaches to user education that have been suggested by Tedd (1977: 45), Boss (1979: 57-60) and Lovecy (1984: 219-225). These include advance notice of implementation through newspaper articles,

use of leaflets, newsletters and where possible, the radio, displays, demonstrations, and so on. Where this is done effectively, there is surprisingly little resistance from users as the University of Toronto experience showed as reported by Blackburn (1979: 137):

"We were braced for a sharp hand-to-hand engagement of explaining and training. Our staff were girded for the attack, but it never came; most of the readers simply walked past them to the COM viewers and went to work"

2.4.3 Evaluation and Control.

Monitoring and evaluating systems is the most neglected area in the management of library automation (Clayton, 1987: 222-230). The reasons for this are threefold. First, once the system is up and running, it is considered as sufficient evidence of success. If, on the other hand, it is not working, there is a tendency of keeping the head down and not drawing attention to the fact and hoping that difficulties will be resolved. Secondly, there is perceived lack of time; and thirdly, there is lack of knowledge of monitoring techniques which can be applied. This is not solely a problem of ignorance but rather a reflection of the nature of library

services where output and the associated benefits are not easily quantifiable. But there are general methods for monitoring and evaluating systems which can be applied to library systems.

After the system has been running for some time, there should be a review of the system to ascertain whether the stated objectives have been attained (Luker and Runyon, 1975/79: 665-670; Lieberman, 1982: 82-85; Rowley, 1985: 20). If the phased approach is adopted, there will be pressure to expand to other areas. This should be done after ensuring that the system is truly successful. During evaluation the following questions should be asked:

- a) Was the system delivered as defined in the contract?
- b) Was the training of staff adequate?
- c) Is the performance of the machine satisfactory?
- d) How do the actual costs compare with estimated costs?

Use of bar charts and critical path analysis should be useful control tools for the system while it is in progress.

The reasons for evaluating and monitoring the system are to:

1. Justify capital and recurrent expenditures.
2. Be able to identify areas where objectives are not being met and to diagnose the reasons thereof.
3. Identify areas which should have priority for future development.
4. Strengthen maintenance contract with vendor.
5. Identify possible modifications to be discussed with the vendor.
6. Identify possible changes in the manual procedures that interface with the automated system, and
7. Improve work-flow by altering physical arrangements.

The measures that can be taken for the evaluation exercise are time, cost elements, hardware and software performance, productivity and accuracy.

The most common criteria used to measure performance are time and costs. The activities to be timed should be defined and the results compared with estimated time for an operation.

This will give evidence of speeding up of procedures and when translated in money terms, it will be evidence of savings in terms of staff costs. It will also be possible to identify any activity or activities which might be taking a disproportionate amount of time in a sequence. Investigations can then be instituted to reveal the cause or causes after which remedies can be applied.

Cost elements which must be tracked and controlled are staff costs, overhead costs, materials costs, maintenance, training costs (if proportionately too high, training method and/or recruitment policy should be reviewed), file creation, data output and storage plus any other costs of miscellaneous operations.

The performance of the hardware and the software should be measured. This is done in terms of speed, reliability, maintenance and operating costs. A record should also be kept of any faults and downtime and measures taken to remedy them. Response time should also be recorded. The information on the hardware and/or software can be used for replacement decisions and for improvement.

Productivity which is a measure of system performance that states the relationship between input and output level should be recorded. The measure is given by the following formula (Clayton, 1987:225):

$$\text{Productivity} = \frac{\text{Output level}^*}{\text{Input costs}}$$

A low reading results when the output volume is low and costs (input) are high. This should be compared with the old practices to show whether the new system is more efficient and economical.

Accuracy is a measure of freedom from error and is usually related to productivity (Clayton, 1987: 226). Errors over a given time gives a measure of the system performance.

Evaluation and control are vital steps to ensure that the library is achieving its goals. The findings of the continuous evaluation process should be totalled after the system has been in operation for a while, say a year, and certainly before the expiry of the guarantee period. The indicated course of action should then be taken.

2.5 POTENTIAL HAZARDS.

There is no denying that automating a library can be a risky undertaking as Tedd (1977: 8-9), Boss (1979: 63-70) and Lovecy

*These units could be items catalogued, issues made or orders placed and will depend on the operations being considered.

(1984: 203-217) rightly warn. The library may have researched all the possible outcomes and made careful estimates of the probability of success of each and yet not be able to predict what will actually happen.

2.5.1 Risks.

The major risks mentioned by Boss (1979: 65-69), Library Association Report (1982: 4-6, 11-12), Lovecy (1984: 203-217) and Lieberman (1982: 121) are: inadequate resources, organizational changes, the nature of the technology and impact on staff. The first constitutes the greatest risk especially where an in-house integrated system is involved. A library may realize mid-way that it lacks the human and financial resources to see the project through. Florida Atlantic University discovered just that (Boss, 1979: 65).

The traditional library organization structure is built around files. When the latter begin to disappear and units also disappear, the organization chart also shrinks (Gapen and Morita, 1978: 5-21). This causes a sense of insecurity in staff.

The immaturity of the field, lack of standards and systems compatibility and the dynamic nature of

the field constitute another set of risks. Bibliographic utilities*, online databases and turnkey systems are growing at an exponential rate (Matthews, 1984: 853-860). The number of online databases has been doubling every two to three years since 1971 (Koenig, 1987: 51). The current technology has also enabled the creation of meta-information systems that reveal the existence of information or documents that might contain needed information. But systems that are truly information retrieval systems rather than document directory retrieval systems are only beginning to be developed (Koenig, 1987: 52; Woods, 1986: 379-380).

The current state of the art in automation is a dynamic one (Lieberman, 1982: 12). Just when one gets ready to make (or worse, just after one has made) a decision, there is a new development. In fact, the maximum time a system vender will commit to supporting a system is usually ten years and may be less (Clayton, 1987: 149). The almost total lack of comparative or even detailed descriptive information also compounds the risks by making it nearly impossible to evaluate the claims of equipment and service vendors (Library Association Report, 1982, 1982: 11-12).

*A fullfledged network hybrid with widespread operational information output (Samuelson, 1977: 95).

2.5.2 Problems.

Many of computer - based library systems stem from poor communication between librarians and computer people (Tedd, 1977: 8). This has resulted in some badly designed systems which either do not reflect the requirements of the library or are inefficient and costly to operate.

The second problem is caused by a poor understanding of information work leading to inefficient and ineffective use of the new technologies. This is usually caused by not having a responsible person from the library taking charge of the development of the computer based system.

Frequent lack of available time and money necessary to develop the system constitutes the third problem. This can be minimized by accurate estimation of these resources before starting a project (Tedd, 1977: 8). The fourth problem may arise from staff resistance to change. This has been mentioned by some authors as a significant, if immeasurable factor in the automation of a library (Boss, 1979: 79-81; Luquire, 1983: 344). Such resistance is related, among other things, to fear of failure on the part of the staff.

A related problem may arise from management's behaviour. Adoption of automation causes a reorganization of communication patterns from vertical to horizontal or even matrix patterns (Lovecy, 1984: 171). Some managers may resist this. A more important aspect of this is the possible problems which may arise if the attendant changes are not handled properly (Library Association Report, 1982: 19).

The technology will influence the distribution of tasks between staff groups and of power and control between leaders and conflicts are likely to arise.

Other likely problems relate to ownership, copyright, data security and the right to re-use bibliographical records acquired from external databases (Lovecy, 1984: 154; Clayton, 1987: 187-192). That is, how to comply with the existing laws relating to these.

It is important for the librarians to be aware of these risks and potential problems so that these problems can be avoided in the final system.

In summary, the literature reviewed here reveals that computers in libraries have been around for a relatively short period. The

computer, with its attributes of speed, high capacity and flexibility came on the scene at a time when libraries were facing problems of information explosion, rising costs of materials and labour and changing expectations of users: problems which could be solved by just such a machine. As a result its application in libraries has spread rapidly in North America, Europe and further a field. The libraries in the forefront of these developments are those maintained by public funding (university, college, and public libraries). However, computer implementation in libraries has far reaching repercussions on staff, the library's operations and indeed the whole organization: what one author has termed as "the latest phase in industrial revolution" (Spyres-Duran, 1979: 29). Despite automation's benefits to libraries, it is not always the answer to all the library's problems. Indeed, the literature warns that there are many attendant problems and risks associated with computerization which should be taken into account by any library contemplating automation. This study was aimed at finding out the need for, and views held by librarians about computerization in libraries in Kenya.

CHAPTER 3.

RESEARCH DESIGN

3.1 Introduction.

In chapter two, literature relating to the field of the study was reviewed. The short history of automation in libraries revealed that there are particular needs and benefits that have made libraries in the developed countries embrace this new technology. This chapter will deal with research design which is to guide research intended to find out whether similar needs obtain in Kenya and further to find out the views librarians have about computerization.

3.2 The Population.

The population of interest in this study consisted of all the libraries in Kenya with the exception of primary and high school libraries. The list used for this purpose was the one compiled by Robins (1984). Branches of the bigger libraries were not considered as separate entities. The total population arrived at after taking the above provisos into account were 185. Of these, 115

were special libraries, 60 academic and 10 public libraries.

On the whole, libraries are found in the major towns with a disproportionate number of them being located in and around Nairobi. Their sizes range from those libraries whose book stock is very small (equal to or less than three hundred volumes) to very large (over three hundred and fifty thousand) and from those run by one person on a part time basis to those libraries with more than three hundred employees.

Since the population was not too large, it was decided that no sampling would be carried out and therefore the relevant data was sought from the whole population.

3.3 Data Collection Instrument.

The information sought in this study was collected through the use of a structured questionnaire which was accompanied by a letter to the respondents (Appendix II).

In preparing the questionnaire, reference was made to the relevant literature and discussions were held with a few librarians

some of whose libraries are computerized and some whose libraries are not yet computerized.

As a result of the population distribution it was decided that some of the questionnaires would be mailed and the rest would be "dropped-and-picked" later. The former method was used for those libraries outside Nairobi and the latter for those within Nairobi.

There were three main sections to the questionnaire. The divisions were for ease of the respondents and for classification purposes. Section A collected general information data from all the respondents. This information pertained to the name of the library, its size in terms of personnel and book stock, type of library and the status of the library as far as computerization was concerned. Section B and C elicited data from those libraries which have and those which have not been computerized respectively. Some questions were designed to collect data pertaining to the need for automation. Each of these questions comprised several parts. Data relating to image held about computers was elicited through other questions as discernible in Appendix II. From those libraries

which have or are planning computerization, further information on functions that are (or planned to be) computerized was collected by yet several questions.

Individual statements and/or questions consisted of mainly closed-type with a few open-ended questions (Appendix II). Most of these were scaled in accordance with a Likert-type scale.

The questionnaire was directed to the librarian, documentalist or the person incharge of the library*. A self addressed and stamped envelope was enclosed with the questionnaires which were mailed in an attempt to raise the response rate. A follow-up for non-returned questionnaires was accomplished by telephoning the relevant libraries.

Of the 185 questionnaires distributed, 107 (58%) were returned. Five of these could not be analysed as they were either too incomplete or badly spoilt. As a result, only 102 were analysed. These were made up as follows: 64 (63%) from special libraries, 30 (29%) academic and 8 (8%) from public libraries.

*These were assumed to be in the best position to supply the required information.

3.4 Operationalization of the study variables.

3.4.1 Independent Variables.

Libraries are usually classified according to the clientele they serve. These are special, academic, public and national. For the purposes of this study the last two will be considered as one. Data will therefore be classified as emanating from libraries which fit the following definitions*.

3.4.1.1 Special Libraries

A special library is one that is maintained by an individual, corporation, association, government agency or any other group. It also means a collection of books and other printed, graphic or record material dealing with a limited field of knowledge, and provided by a learned society, research organization, industrial or commercial undertaking, government or educational institution. It is intended to serve the needs of a portion of the community requiring detailed information respecting a limited subject field.

*The definitions are from Harrod, L.M., compiler. The Librarian's Glossary and Reference Book. 4th rev. ed. London: Andre Deutsch, 1977. pp.39, 673, 774.

3.4.1.2 Academic Libraries.

These are libraries of universities, colleges, and all other institutions forming part of, or associated with, institutions of higher education.

3.4.1.3 Public Libraries.

A library provided wholly or partly from public funds, and the use of which is not restricted to any class of persons in the community but is freely available to all.

3.4.2 Dependent Variables.

The three dependent variables of this study were need, image and extent of computerization.

3.4.2.1 Need For Computerization.

Such authors as Hunter (1985: 3), Rowley (1985: 3-4) and Clayton (1987: 1) and others indicate that libraries turn to automation because of the problems they are facing in serving their clientele. These problems are their reasons or needs which make them look for solutions one of which is the computer. To measure this variable a list of statements to which respondents indicated extent to which

they applied in their library was provided. To determine a library's need for computerization, the scores from these statements were added up in order to get a total score*. A high score indicated a higher need.

3.4.2.2 Image Held About Computers by Library Staff.

The image variable refers to the view that is held by the library staff about computers. To measure this component, a list of statements drawn from the literature was used. A Likert-type of scale was used with five intervals scaled from "to a greater extent" to "to no extent".

The proportion of libraries scoring below the neutral score, "to a moderate extent" was considered to have staff with a positive image while those above were considered to have a negative image of computers.

*For previous use of this method, see F.N. Kibera. The Effects of Selected Communications Variables on the Adoption of New Agricultural Practices By Smallholders in Central Kiambu, Kenya. University of Toronto, Ph. D. Thesis, 1979.

3.4.2.3 Extent of Computerization.

The 'extent' variable refers to the functions (Circulation, Cataloguing, Orders, Periodicals) which have been or are planned to be computerized. It also refers to the uses made or planned for computerization.

To measure this component, different functions and uses of computers were listed. The responses were tallied and presented in tables.

3.5 Data Analysis Techniques.

The collected data was summarized and presented in tables. Proportions and mean scores were also given. A technique which would check the amount of variation in the scores between the three types of libraries against the variation among the libraries in each category was required. The analysis of variance (ANOVA) was found to be an appropriate technique (Iversen, 1976: 25-39). It is wide in its application and its assumptions of data being collected independent of each other, quantities being additive and normal distribution were not going to be violated.

The author, therefore, found it appropriate to use the analysis of variance (ANOVA) to determine the statistical significance of the group mean scores of the different categories and types of libraries on two of the three dependent variables, namely, need and image of computerization. The results of these analyses are discussed in the next chapter.

4.1.2. Analysis of the Data.

This chapter analyzes the data that were collected in accordance with the research design presented in the last chapter. The present chapter is divided into three main parts. The first part analyzes summary and general data. The second part analyzes data by type of library and further on the basis of computerization or lack of it. The final part is devoted to testing the statistical significance of the group mean scores using the analysis of variance as outlined at the end of chapter three.

4.2. Overview of the Data.

The first step in the analysis was to give an overview of the data. This involved tabulation of the responses to the questionnaire. These are presented in Table 1.

CHAPTER 4.

DATA ANALYSIS AND FINDINGS.

4.1 Introduction.

The previous chapter presented the research design that was used, operationally defined the relevant independent and dependent variables and briefly discussed why the technique of analysis of variance is appropriate for analyzing the data of the present study. This chapter analyses the data that were collected in accordance with the research design presented in the last chapter. The present chapter is divided into three main parts. The first part analyzes summary and general data. The second part analyzes data by type of library and further on the basis of computerization or lack of it. The final part is devoted to testing the significance of the group mean scores using the analysis of variance as outlined at the end of chapter three.

4.2 Overview of the Data.

The first step in the analysis was to give an overview of the data. This involved tabulation of the returns to the questionnaire. These are presented in Table 1.

TABLE 1. Returns To The Questionnaire.

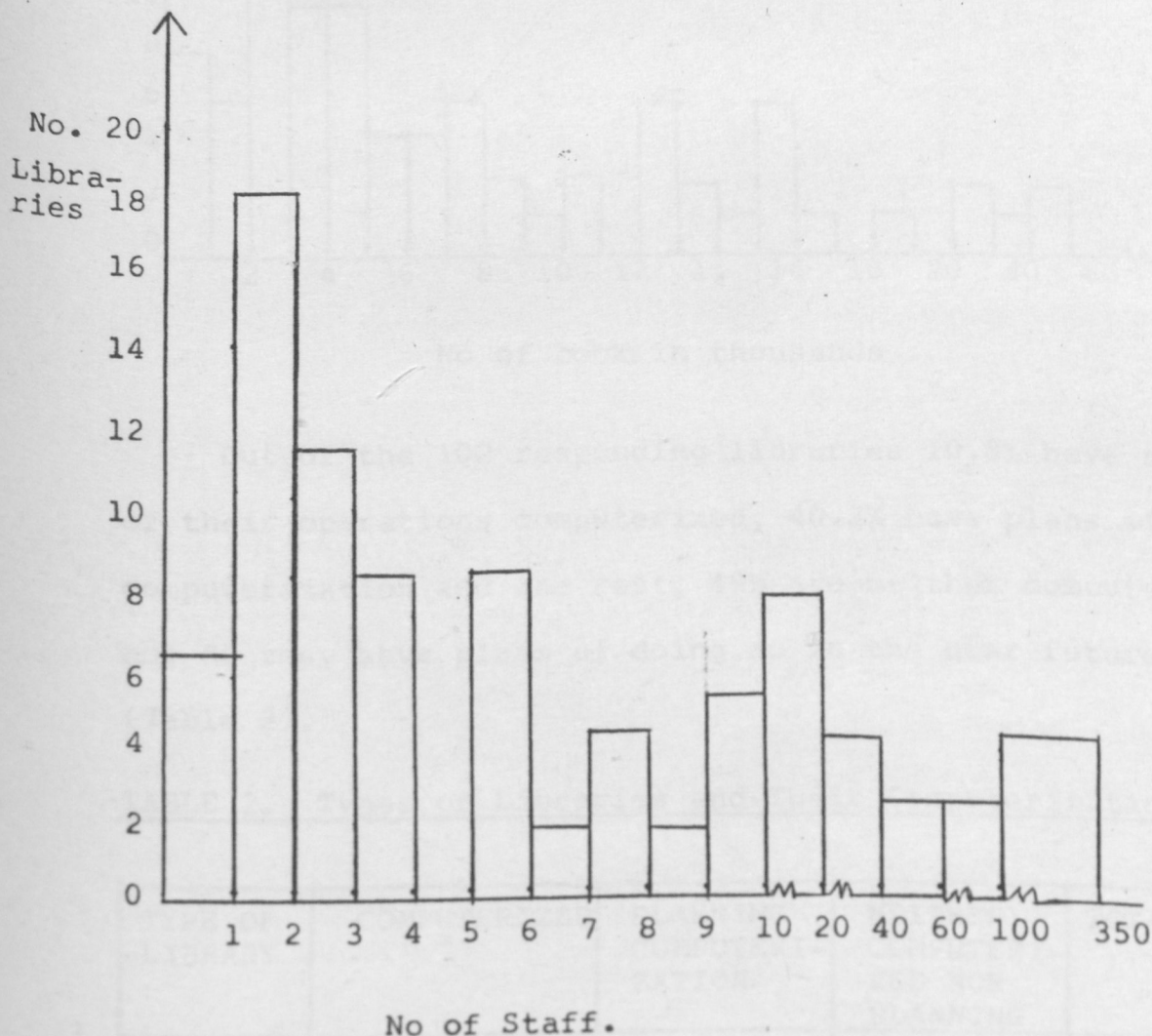
Type of Library	Number of Questionnaires Distributed.	Percentage.	Number of Returns	Percentage of Returns
Special	115	62.2	64	62.75
Academic	60	32.4	30	29.41
Public	10	5.4	8	7.84
TOTAL	185	100	102	100

Most of the returns to the questionnaire were received from the special libraries followed by academic and public libraries in that order. The responses followed closely the proportion of the distributed questionnaires. As is discernible from Table one, 62% of the questionnaires were sent to special libraries and the response rate was 64%; 32% were addressed to academic libraries and 28% responded; and 5% were sent to public libraries and 7% responded. The overall response rate was 58%.

Of these libraries from which responses were received, the oldest library was established in 1902 while the newest was set up in 1986. The sizes

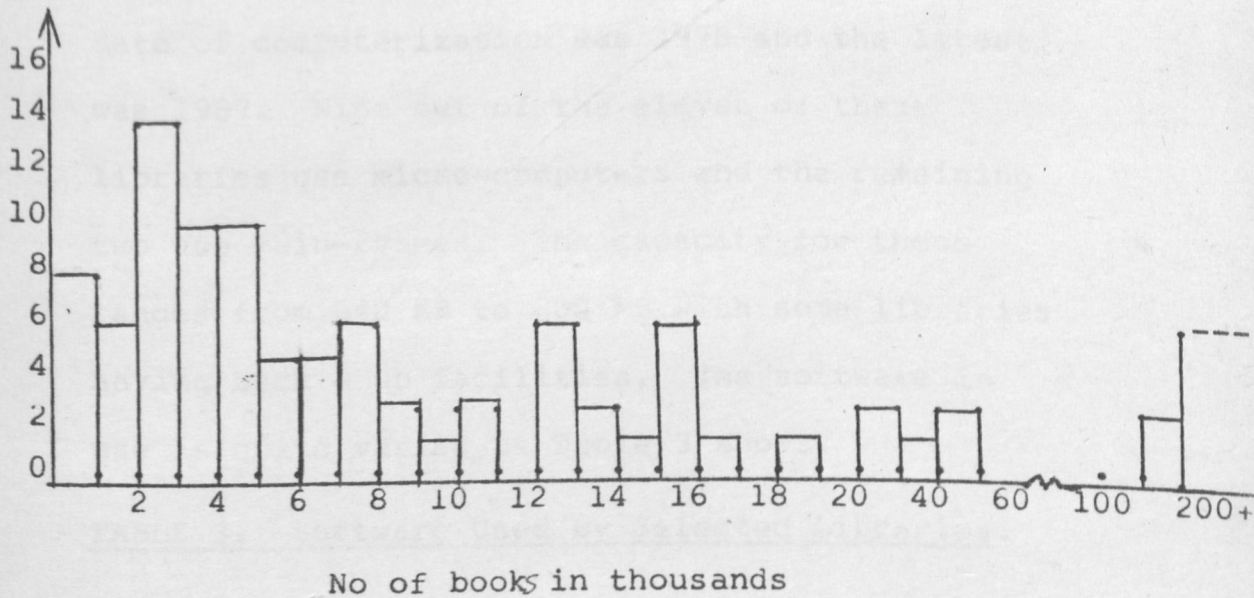
of these libraries in terms of both staff and book stock are also very varied. The range is from those libraries run by one member of staff to a few libraries which employ more than 200 people. As figure 1 shows, the majority of libraries employ between one and six people.

FIGURE 1. Number of Employees In Libraries.



The stock (books, journals and other materials) is just as varied ranging from 100 items to one library with over one million items (Figure 2).

FIGURE 2. LIBRARY STOCK.



Out of the 102 responding libraries 10.8% have some of their operations computerized, 40.2% have plans of computerization and the rest, 49% are neither computerized nor do they have plans of doing so in the near future (Table 2).

TABLE 2. Types of Libraries and Their Computerization State.

TYPE OF LIBRARY	COMPUTERIZED	PLANNING COMPUTERIZATION	NEITHER COMPUTERIZED NOR PLANNING	TOTAL
Special	10	24	30	64
Academic	1	14	15	30
Public		3	5	8
TOTAL	11(10.8%)	41(40.2%)	50(49%)	102(100%)

4.3 Computerized Libraries.

All the computerized libraries except one are special libraries. The odd one is an academic library. Among these, the earliest date of computerization was 1978 and the latest was 1987. Nine out of the eleven of these libraries use micro-computers and the remaining two use main-frames. The capacity for these ranges from 640 KB to 800 MB with some libraries having back - up facilities. The software in use is quite varied as Table 3 shows.

TABLE 3. Software Used By Selected Libraries.

SOFTWARE	NO. OF LIBRARIES	SOFTWARE	NO. OF LIBRARIES
INMAGIC	2	MULTIMATE WORD PROCESSING	1
MICRO-CDS/ISIS	4	CD - ROM	1
COBOL-PROGRAMS	1	Wang Word Processing	1
MICROSOFT WORD	1	D-BASE III+	3
WORD Perfect	1		

Micro-CDS/ISIS was used by most libraries followed by D - Base III+ and INMAGIC. The other softwares were each used by one library.

4.3.1 Need For Computerization.

For the purposes of this study, need was measured through provision of a list of statements to which respondents indicated the extent to which the statements applied to their library. Thus "to a greater extent" score 5, "to a great extent" 4, "to a moderate extent" 3, "to a small extent" 2 and "to no extent" 1. Mean scores were then calculated from these. Among the libraries which had computerized their operations, more than half gave the following as their reasons for resulting to computerization:

- Staff could not cope with the work load.
- New services were needed but the library could not offer them (mean score 3.8).
- The old system was very slow, cumbersome, inefficient and unable to cope with increased demand (mean score 4.05).

The statement that rated lowest as a reason for computerization was staff costs due to routine duties with a mean score of 1.9 (Appendix VII).

The uses made of the computer are shown in Appendix VIII. Most of the libraries who responded to this question indicated that the supplied statements applied to their library to

a "greater" or "great" extent. The computer is used for decision - making, for speeding up of the routine jobs, communication and overall it seems to have measured up to the librarians' expectations. Its effect on the job has been to improve it as indicated by a mean score of 4.4 for "It helps me do my job better". It should be noted that six out of the seven who responded to the statement on staff reduction indicated that this did not apply in their case.

4.3.2 Image Held About Computers.

Table 4 shows the image held by staff about computers. Most members of staff welcomed the computer as indicated by the score for this statement, a mean score of 4.8. The next score to this was a mean score of 2.7 being for "Staff thought they might not learn how to use the computer". The staff seem not to have been afraid of being replaced by the machine. All the libraries responding to the statement "staff thought they would loose their jobs" indicated that this did not apply in their library.

TABLE 4. Image Held About Computers By Library Staff.

Attribute	Mean Score
It was welcome	4.8
With fear	2.3
Staff thought they would loose their jobs.	1.0
Staff thought they might not learn how to use the computer.	2.7

Asked to indicate the causes of negative feelings (if any) towards the computer, the respondents gave the following in order of importance (Table 5):

TABLE 5. Reasons for Negative Feelings Towards the Computer.

Negative Feeling	Mean Score
Lack of knowhow	2.7
Fear of loss of job	1.0
Fear of loss of prestige status	1.8
Inability to learn new technology.	2.4
Resistance to change	1.8

- . Lack of knowhow
- . Inability to learn the new technology
- . Fear of loss of prestige or status
- . Resistance to change

However, all the attributes received very low mean scores. The highest mean score was 2.7 and the lowest was 1.0. This is an indication that negative reactions were almost non-existent but they were also barely positive.

4.3.3 Operations Which Are Computerized.

TABLE 6. Computerized Housekeeping Functions.

Application Area.	No of Libraries	Percentage
Circulation Control.	One in process of implementing this.	
Cataloguing	7	63.6%
Periodicals (Serials)	6	54.5%
Orders (Acquisitions)	5	45.4%
Information retrieval.	9	81.8%

Table 6 shows the extent to which automation has been introduced in the main housekeeping or library management areas. The figures show the

number of libraries which have automated a particular operation. Nine out of the eleven libraries or 81.8% have automated information retrieval while cataloguing is automated by 63.6% of the libraries. The figures for the other functions are periodicals or serials, 54.5% and orders or acquisitions, 45.4%. For the latter, automation is rudimentary and confined to the offline production of lists. **Access** to the computerized data is by staff only. Readers use printouts or they have to get assistance from library staff.

The uses to which these computers have been put is shown in table 9 below.

TABLE 7. Uses Made Of the Computer By Libraries.

Use	No of Libraries	Percentage
Information Retrieval	10	90.9%
Storage of Information	10	90.9%
To help with Information Overload.	4	36%
For Analysis of Information.	4	36%

From the above table, it is discernible that the two uses made of the computer by most of the

responding libraries are "information retrieval" and "storage of information". The other uses were shown by only four libraries or 36%.

When the respondents were requested to indicate any other uses, other than the listed ones, made of their computers, they indicated the following (not in any order):

- . Selective dissemination of information
- . Production of current awareness bulletins, generating lists of new acquisitions and production of other documents.
- . Word processing
- . Bibliographic checking
- . Up-dating of files.

4.4 Planned Computerization.

The libraries planning automation fall into the three categories of libraries, namely, special, academic and public. This is unlike the computerized libraries which are predominantly special.

4.4.1 Need For Computerization.

The need for computerization was measured using statements similar to those for computerized libraries. The resulting picture is as shown in Table 8.

TABLE 8. Mean Scores Of Reasons For Planning
Computerization.

NEED STATEMENTS	SPECIAL LIBRARIES	ACADEMIC LIBRARIES	PUBLIC LIBRARIES
Staff cannot cope with the current work load.	3.7	3.9	2.5
Need to offer new services.	4.0	4.5	4.5
The current system is:			
Slow	3.2	3.6	3.0
Cumbersome	3.5	3.1	2.0
Inefficient	2.9	3.0	1.5
Unable to cope with demand	3.6	4.1	3.0
Irritating to users	2.5	3.0	1.0
Heavy staff costs associated with routine duties.	1.9	3.6	3.5
Grand mean score	3.2	3.5	2.77
	n [*] =292	n=287	n=36

*n is larger than the sample size because
respondents could tick more than one
statement.

Need to offer new services among the special libraries had the highest mean score of 4.0 followed by heavy work load (3.7) and dissatisfaction with the current work load a close third. Costs associated with staff's time on routine duties had a mean score of 1.9 indicating that this was hardly considered as a reason in the planning of computerization.

Among the academic libraries the need with the highest mean score is for "need to offer new services" which was 4.5. This was followed by "the current system being unable to cope with increased demand", mean score of 4.1. Other statements received a mean score of 3 and above indicating that the statements applied in these libraries to more than a moderate extent. The grand mean score for this category was 3.5.

The statements for measuring need for public libraries had mixed reactions. Thus while "need to offer new services" and "heavy staff costs associated with routine duties" had mean scores of 4.5 and 3.5 respectively, all the others had a score of 3.0 or less. This is an indication that most of the statements applied in the case of these libraries only to a moderate extent.

The major reasons given by all the three types of respondents is "need to offer new services", "current system being slow" and also being "unable to cope with demand".

To determine the statistical significance of the mean scores for the three types of libraries an analysis of variance (ANOVA) test was carried out (see Appendix XII). The relevant F-test and the analysis of variance for the need variable for the three types of libraries is presented in table 9.

TABLE 9. Analysis Of Variance For Need Scores Of the Planning Libraries.

	<u>Mean Square</u>	<u>Degrees of Freedom</u>	<u>F-test</u> *	<u>Signific.</u>
Among groups	16.7928	2	41.907	0.05
Within groups	703.7425	38		

The critical value of F at 5% significant level with 2 and 38 degrees of freedom is 3.23. As the calculated value is greater than this, we conclude

*All tests in this study will be done at 5% level or higher.

that the mean scores are significantly different for the three types of libraries. This means that the differences in the mean scores did not appear at random and that the needs for computerization does differ with the type of library.

4.4.2 Image Held by Library Staff About Computers.

Asked how the plans for computerization have been received by library staff, the respondents indicated as shown in table 10.

Plans for computerization have been received "with keenness" by library staff as the table shows. In all the three types of libraries the mean score for this statement is above 4. This is an indication that the statement applies in 33 of the 41 libraries to a "great extent". Negative image had mean scores of 1.7 or less indicating that this aspect was almost non-existent. One of the respondents did indicate that reactions varied with the level of staff.

TABLE 10. Image Held About Computers.

DESCRIPTORS	SPECIAL LIBRARIES	ACADEMIC LIBRARIES	PUBLIC LIBRARIES
With keenness	4.3	4.5	4.6
With fear	1.5	1.6	1.0
With indiff- erence	1.7	1.5	1.0
Grand mean	2.9	2.8	2.2
	n=51	n=31	n=13

4.4.3 Operations Planned For Computerization.

Respondents indicated that they planned to automate circulation control, cataloguing, periodicals (serials), order (acquisitions) and information retrieval. The numbers and percentages of libraries planning to computerize different functions are shown in Table 11.

The functions which are planned for computerization by most libraries are information retrieval, cataloguing and periodicals by special libraries; information retrieval, cataloguing and orders (acquisitions) by academic libraries; and information retrieval, circulation and cataloguing by public libraries. Overall, information retrieval is

TABLE 11. Functions Planned For Computerization.

FUNCTION	TYPE OF LIBRARY							
	SPECIAL		ACADEMIC		PUBLIC		TOTAL	
	No.	%	No.	%	No.	%	No.	%
Circulation	6	26	7	50	2	67	15	38
Cataloguing.	12	52	10	71	2	67	24	60
Periodicals	10	44	8	57			18	45
Orders	4	17	10	71	1	33	15	38
Information Retrieval.	17	74	13	93	3	100	33	83

planned for by 83% of the respondents; cataloguing by 60%; periodicals by 45%; and orders and circulation control by 38% each.

It appears that libraries are planning to use the computer as a recording and "finding" tool, that is, as a means of ascertaining the whereabouts of material or information.

In responding to the uses planned for the computer, the respondents indicated the following (in order of emphasis): for storage of data, information retrieval, for analysing data and finally to assist with information overload (see also Table 14).

TABLE 12. Computer Use Planned For.

USE	TYPE OF LIBRARY							
	SPECIAL		ACADEMIC		PUBLIC		TOTAL	
	No.	%	No.	%	No.	%	No.	%
Information Retrieval	21	91.3	13	93	3	100	37	93
Storage	23	100	13	93	3	100	39	98
Information Overload	8	34.8	7	50	2	67	17	43
Analysis	14	60.9	6	26	2	67	22	55

4.5 Computerization Not Planned For.

Almost half (49%) of the respondents fell in this group and comprised 30 special libraries, 15 academic and 5 public libraries.

4.5.1 Need For Computerization.

Again this variable was measured by a list of statements similar to those of the other two groups. The responses from this group are presented in Table 13.

From these tables it is discernible that the statements which were to measure need for all the three types of libraries had a low mean score (less than 3.0). They all indicated that the current system is slow to a small extent as evidenced by the mean scores (2.8 for special and academic and 2.3 for public). The overall mean for special libraries was higher than for the other two. That is, 2.2 as compared to 1.8 for academic and 1.6 for public libraries.

TABLE 13. Mean Scores Of the Need Variable For
Non-Computerized Libraries.

a) By Type Of Library.

STATEMENT	SPECIAL LIBRARIES	ACADEMIC LIBRARIES	PUBLIC LIBRARIES
Staff can cope with work	2.0	1.9	1.5
Able to offer all services	2.3	1.9	1.5
Current system is: slow	2.8	2.8	2.3
Cumbersome	2.5	2.6	1.5
Inefficient	2.2	2.2	1.5
Able to cope with demand	2.3	2.0	1.2
No complaints from users.	2.5	1.7	1.6
Grand mean	2.2	1.8	1.6
	n=163	n=82	n=28

b) By Size Of the Library.

STATEMENT	LIBRARIES WITH LESS THAN 20,000 VOLS.	LIBRARIES WITH OVER 20,000 VOLS
Staff can cope with work	1.9	3.6
Able to offer all services	2.1	2.3
Current system is: Slow	2.5	4.0
Cumbersome	2.4	3.6
Inefficient	3.7	3.5
Able to cope with demand	2.1	3.4
No complaints from users	2.7	3.3
Grand mean	2.4	3.4

To test whether these differences were statistically significant, an analysis of variance (ANOVA) was carried out. The results of this analysis are shown in Table 14.

TABLE 14. Analysis of Variance for Need Variable
for the Non-Computerized Libraries.

a) For the Different Types Of Libraries.

	<u>Mean</u> <u>Square</u>	<u>Degrees of</u> <u>Freedom</u>	<u>F-test</u>	<u>Signific.</u>
Among groups	24.304	2	3.77	0.05
Within groups	91.66	47		

The critical value of F at 5% significance with 2 and 47 degrees of freedom is 3.18. Since the calculated value of 3.77 is greater than the critical value of 3.18 we conclude that the differences in the mean scores are not caused by random variances and are therefore significant. It can therefore be concluded that the need for computerization is more pressing for special libraries than for academic and public libraries.

b) For Large and Small Libraries *.

<u>Source of</u> <u>Variation.</u>	<u>Mean</u> <u>Square.</u>	<u>Degrees of</u> <u>Freedom.</u>	<u>F-test</u>	<u>Signific.</u>
Among groups.	18.6	1	3.5	0.05
Within groups.	65.13	48		

*Libraries with less than 20,000 volumes were considered small and those with over this number as large libraries.

The critical value of F at 5% significance with 1 and 48 degrees of freedom is 4.03. Since the calculated value of 3.5 is less than this critical value we conclude that the differences in the mean scores are caused by random variation and are not significant. It can, therefore, be concluded that the need for computerization does not depend on size of the library.

4.5.2 Image Held About Computers By Library Staff.

This aspect was ascertained through statements which described a computer and to which the librarians indicated the extent to which these statements applied to their libraries. High mean scores indicate a poor image while low scores indicate a good image. The responses to this are presented in Table 15.

TABLE 15. Mean Scores For Image Held About
Computers.

DESCRIPTORS	SPECIAL LIBRARIES	ACADEMIC LIBRARIES	PUBLIC LIBRARIES
Computers are too expensive	4.1	4.2	4.0
A computer is a many handed clerk	3.6	3.9	4.0
It is capable of doing almost anything	3.7	3.1	2.75
We do not need computers in Kenya	2.2	2.0	3.25
Computers will cut down on available jobs	3.1	2.7	2.0
Grand mean	3.4	3.3	2.76
	n=100	n=40	n=21

As Table 15 shows public libraries exhibited a better image of the computer than either the academic or special libraries. Both special and academic libraries respondents agree that computers are needed in Kenya (mean scores of 2.2 and 2.0 respectively). Academic and public libraries respondents did not think that "computers will

cut down on available jobs". On the whole, the image held about computers is neither too poor nor very good as indicated by the grand means.

4.6 Summary.

In summary, the findings of the study have highlighted the need and image of computerization of library operations for the three types of libraries. It was found that need for computerization among the special libraries differed depending on whether the libraries are computerized or not. For the other two types, academic and public, the differences are not significant and therefore it can be concluded that their needs are similar.

Most of the respondents in the computerized and planning libraries category indicated a positive image of the computers. The non-computerized libraries had higher mean scores which were indicators of negative image.

On the question of extent of computerization, the functions which were computerized, or planned to be, by most libraries were information retrieval, cataloguing and serials (periodicals) control.

There was an overwhelming support and willingness to join a data co-operative. Of the 92 libraries who responded to this question 71 (77%) were for co-operation and 21 were not sure. No respondents indicated outright unwillingness to do so. Conclusions drawn from the study are dealt with in the next chapter.

CHAPTER 5.

SUMMARY AND CONCLUSIONS.

This concluding chapter will summarize the findings of the study in relation to the major questions raised in the objectives of the study. The chapter also includes conclusions drawn from the study, recommendations, limitations of the study and finally suggestions for further research.

5.1 Summary.

There were three major issues which were tackled in this study. First, the study sought to determine computerization needs of libraries. Second, the study sought to investigate the perceived image of computer application in libraries in Kenya, and finally, to determine the extent to which libraries in Kenya have computerized their operations.

Regarding computerization needs, it was found that among special libraries, need was higher among those which have computerized and those who are planning to computerize.

For the academic libraries there are no differences between the planning and non-planning libraries as far as needs are concerned. But these have a lower mean score than special libraries. It is the same case with public libraries where the needs for planning and non-planning libraries are not very much differentiated. However, the mean scores are lowest for this category of libraries.

As far as image held about computers is concerned, the findings were that both computerized and planning libraries groups have a positive image of the computers. The non-computerized libraries had higher mean scores which indicated that on the whole their image of the computer was poor.

On the issue of extent of computerization, it was found that the functions which were computerized, in order of emphasis, were information retrieval (82%), cataloguing (64%), serials or periodicals (55%) and acquisitions or orders (45%). The functions that are planned for computerization are, again in order of

emphasis: information retrieval (83%), cataloguing (60%), periodicals (45%) and circulation control and orders (both 38%).

5.2 Conclusions.

The foregoing findings lead to a number of conclusions. First, librarians in Kenya are turning to the computer to solve the problems of pressure of work, need to offer new services and above all because the current systems have been found to be slow and inefficient. Of less importance as reasons for computerization are costs associated with personnel for the routine duties. This, however, may be attributed to what was referred to earlier as a problem of the nature of library services where output and associated benefits (costs in this case) are not easily quantifiable. Also for budgeting purposes, staff remuneration come under the parent body rather than the library. The conclusion to be drawn is that the current library systems are not satisfactory.

Second, the general image about computers is poor especially among the staff in non-computerized libraries. Although this is as

expected, such feelings as were expressed of computers cutting down on available jobs, there being no need for computers in Kenya and computers being too expensive, lead one to conclude that information about computers is not widely available.

Third, the operations favoured by librarians for computerization are information retrieval and cataloguing functions*. This may have been influenced by the proportion of special libraries in the computerized / planning group being higher (24 out of 55). Finally, there is need for more cooperation among libraries especially as regards computerization.

5.3

Recommendations.

Emanating from the foregoing, the following recommendations are presented:

- a) Current library systems need to be looked into with a view to improving them.
- b) Encouragement should be given to the development and the use of common retrieval keys and the use of common acronym keys. This would assist in co-operation and resource sharing.

*This is consistent with studies in other organizations showing that routine transactions such as invoicing, mailing and so on are prime targets for computerization.

- c) Links should be fostered between libraries (especially the major ones) through the exchange of ideas, plans and eventually machine readable data bases.
- d) Increased practical advice is required on computer systems and their potential application.
- e) A forum is required whereby various groups and organizations in Kenya with an interest in library automation can exchange views. This could be under the umbrella of the Kenya Library Association.
- f) Support should be sought for libraries willing to cooperate in covering specific topics of interest to the country.
- g) There is need for a more systematic approach to both policy planning and implementation. This arises from a concern at size of capital investment required and escalating recurrent costs of supporting library automation.

5.4 Limitations.

The study was constrained by a number of factors. The major limiting factor was time.

This led to the reduction in the scope and depth of the study. Owing to the short time during which the study had to be completed it was not possible to follow-up and receive all the questionnaires. This meant that out of the 185 questionnaires sent, 107 were received out of which 102 were usable. Further, due to shortage of time, the area covered had to be limited to need, image and extent of automation leaving out other related issues such as availability of both hardware and software, computerization costs, cooperation, technical implications and so on.

Other limitations are the ones which are common to all surveys. In any given situation or time span, a study that relies exclusively on self-reporting of needs and image may in some cases not be one hundred percent valid. In some instances respondents may give biased or dishonest answers. This is compounded by the fact that needs and images are likely to change over time.

5.5 Suggestions For Future Research.

Arising out of the findings of the present study and the limitations of the study, the following are suggested areas for research in the field.

1. Economics Of Computerization.

Such areas as cost - benefit studies on library automation to assist with policy planning; investigation of the economics of resource sharing; an assessment of the costs and benefits of developing new in-house electronic information services as against buying-in service; an assessment of the costs involved in sustaining library cooperation for automated services; and an analysis of the size and costs involved in the retrospective conversion of data of important collections, warrant investigation.

2. Technological Aspects Of Computerization.

A technical study of the means of linking major machine readable files to important collections on a national level could be carried out. As well this, an identification of the skills and competences associated with IT (information technology) applications in libraries and an appraisal of the means of introducing them into educational and training

programmes should be done. Still in this area, an investigation of the new technologies most appropriate to the library sector of a developing country would be beneficial.

3. User Analysis.

A detailed analysis of the potential user population for the available and planned electronic information services can be carried out.

4. Library Co-operation For Automated Services.

A general appraisal of the standards required for effective co-operation is yet another area warranting future research.

APPENDIX I.A.

NOTE TO RESPONDENT (MAILED)

Dear Librarian/Documentalist,

Libraries, especially in the western world, are turning to computers for their library operations. This trend has been in evidence in the last thirty years or so.

Although computers have been used in government and commerce for many years in Kenya, their use in libraries is only beginning. In view of this, I intend to carry out a study to identify the need for and scope of computerization of libraries in Kenya.

I plan to gather information from all libraries in Kenya, other than those in the primary and high schools. The attached questionnaire, therefore, seeks your assistance in providing the necessary data. Please respond to the questions as fully as possible.

The completed questionnaire should be returned in the enclosed self-addressed and stamped envelope by the 15th of May, 1988.

Your co-operation will be highly appreciated.

Yours sincerely,

M.N. Muriuki (Mrs)
Researcher

Prof. F.N. Kibera
Supervisor

APPENDIX I.B.

NOTE TO RESPONDENT (HAND DELIVERED)

Dear Librarian/Documentalist,

Libraries, especially in the western world, are turning to computers for their library operations. This trend has been in evidence in the last thirty years or so.

Although computers have been used in government and commerce for many years in Kenya, their use in libraries is only beginning. In view of this, I intend to carry out a study to identify the need for and scope of computerization of libraries in Kenya.

I plan to gather information from all libraries in Kenya, other than those in the primary and high schools. The attached questionnaire, therefore, seeks your assistance in providing the necessary data. Please respond to the questions as fully as possible.

The completed questionnaire will be collected from your library at a mutually agreed time and date.

Your co-operation will be highly appreciated.

Yours sincerely,

M.N. Muriuki (Mrs)
Researcher

Prof. F.N. Kibera
Supervisor

APPENDIX II.

QUESTIONNAIRE

Please answer the following questions by placing a tick (✓) in the spaces provided and/or giving details as may be necessary.

SECTION A: GENERAL

Q. 1. Name of your library _____

Q. 2. When was your library established?

Q. 3. Is your library a) Public Library
(use not restricted to any class
of persons)

(b) Special Library (Specialized
or departmental collection)

(c) Academic Library (belonging
to University, College or
Institution of higher
learning)?

Q.4. What is the size of your library?
Number of employees (clerical
and above)

Books

Periodicals / Journals, etc.

Q.5. Is your library computerized?

YES

NO

If your answer is no, please
go to Q.16.

SECTION B: COMPUTERIZED LIBRARIES

Q.6. When was your library computerized?

Year

Q.7. Does your library have a:

YES NO

Storage Capacity

(i) Mainframe

(ii) Minicomputer

(iii) Microcomputer

Q.8. What software package(s) do you use? _____

Q.9. To what extent do the following statements fit
your reasons for computerizing your library?
(You can tick more than one)

	To a Greater Extent	To a Great Extent	To a Moderate Extent	To a Small Extent	To No Extent
	5	4	3	2	1
a) Staff could not cope with the work-load					
b) New Services were needed but we could not offer them					
c) There were heavy staff costs in the number of staff needed to do the routine work.					
d) The old system was (i) very slow					
(ii) cumbersome					
(iii) inefficient					
(iv) unable to cope with increased demand					
(v) a cause for irritation to users					

(vi) Other
(Specify)

(i) _____

(ii) _____

Q.10. Please specify to what extent the following statements apply in your case regarding computerization.

	To a great extent	To some extent	Some how	A little	Not at all.
	5	4	3	2	1
a) It helps me to do my job better.					
b) It has helped communication within and without the library.					
c) Information for decision-making is more readily available.					
d) It helps with information overload.					
e) It has improved speed of routine operations.					
f) We need few staff.					
g) It has measured to our expectations.					

Q.11. How was the computer received by staff?

	To a great Extent	To some Extent	Somehow	A little	Not at all
	5	4	3	2	1
(i) It was Welcome					
(ii) With fear					
(iii) Staff thought they would loose their jobs.					
(iv) Staff thought they might not learn how to use the computer.					

Q.12. If there were any negative feelings towards the computer, to what extent can you attribute this to: (You can tick more than one).

	To a great Extent	To some Extent	Some how	A little	Not at all
	5	4	3	2	1
a) Staff lacking the knowhow.					
b) Fear of possible loss					
(i) of their jobs.					
(ii) of pre- stige/ status					

	To a great Extent	To some Extent	Somehow	A little	Not at all
c) Unsure of ability to learn a new way of doing things.					
d) Did not like the changes brought about by computers.					
e) Other (Please specify)					

Q.13. What operations have you computerized? (You can tick more than one as applicable.)

Circulation

☐

Cataloguing

☐

Periodicals (Serials)

☐

Orders

☐

Information retrieval

☐

All of the above

☐

Q.14. Do you use your computer for: (you can tick more than one as applicable).

(i) Information retrieval?

☐

(ii) Storage of information

☐

(iii) To help with information overload. ☐

(iv) For analysis of information. ☐

(v) Other uses (please specify) _____

Q.15. Please give any other comments on related aspects not covered above _____

Please go to Q.23.

SECTION C : NON-COMPUTERIZED LIBRARIES

Q.16. Do you have plans of computerizing your library in the near future?

YES

☐

Go to Q.17

NO

☐

Go to Q.21

PART 1. : COMPUTERIZATION PLANNED

Q.17. To what extent would the following describe your reasons for planning to computerise your library?

	To a great Extent.	To some Extent	Some how	A litte	Not at all
	5	4	3	2	1
a) Staff cannot cope with the current workload.					
b) There is need to offer new services but are unable to do so at the moment.					
c) The system is					
(i) very slow					
(ii) Cumbersome					
(iii) Inefficient					
(iv) Unable to cope with increased demand.					
(v) Causing irritation to users					
d) There are heavy staff costs in the number required for routines.					

Q.18. How have staff received the plans for computerization?
(Please indicate to what extent the following statements apply)

	To a great Extent.	To some Extent.	Some how.	A little.	Not at all.
	5	4	3	2	1
a) With keenness.					
b) With fear					
c) With indifference					
d) Other (Specify.....)					

Q.19. What operations are you planning to computerise?
(You can tick more than one if applicable).

Circulation

☐

Cataloguing

☐

Periodicals (Serials)

☐

Orders

☐

Information retrieval

☐

All of the above

☐

Q.20. Are you planning to use your computer for :
(You can tick more than one as applicable).

Information retrieval?

☐

Storage of information?

☐

To help with information
overload?

☐

For analysis of information

☐

Other uses (Please specify) _____

Please go to Q.23.

Part 2. : COMPUTERIZATION NOT PLANNED

Q.21. To what extent do the following statements apply to
your library?

	To a great Extent.	To some Extent.	Some how.	A little.	Not at all
	5	4	3	2	1
a) Staff can cope with the current work load.					
b) We are able to offer all the services demanded by our users.					

	To a great Extent.	To some Extent.	Some how.	A little.	Not at all
	5	4	3	2	1
c) Our current system is:					
(i) Slow					
(ii) Cumbersome					
(iii) Inefficient					
(iv) Able to cope with demand					
d) There have been no complaints from users.					

Q.22. To what extent do the following statement describe a computer.

	To a great Extent.	To some Extent.	Some how.	A little.	Not at all
	5	4	3	2	1
a) Computers are too expensive.					
b) A computer is a "many handed clerk"					
c) It is capable of doing almost anything.					
d) We do not need computers in Kenya.					
e) Computers will cut down on available jobs.					

Q.23. If an interlibrary data cooperative were formed,
would you consider joining it?

YES

☐

NO

☐

NOT SURE

☐

THANK YOU FOR YOUR CO-OPERATION IN ANSWERING THIS
QUESTIONNAIRE.

APPENDIX III.

LIST OF LIBRARIES USING COMPUTERS.

Canadian High Commission Library.

Institute of Computer Science Reference Library
(University of Nairobi).

International Centre of Insect Physiology and
Ecology (ICIPE) Library.

International Council For Research In Agroforestry
(ICRAF) Information/Documentation Centre.

International Laboratory For Research On Animal
Diseases (ILRAD).

Kenya Technical Teachers College Library.

Library of Congress Office.

United Nations Centre For Human Settlements
(UNCHS - HABITAT). Library and Documentation
Centre.

United Nations Environment Programme (UNEP). Library
and Documentation Centre.

United States Information Service, American
Cultural Centre Library.

United States Agency For International Development
(USAID) Regional Office / REDSO / ESA Library/
Development Information Centre.

APPENDIX IV.

LIST OF LIBRARIES AND INSTITUTIONS PLANNING COMPUTERIZATION

	SPECIAL	ACADEMIC	PUBLIC
Bibliotheque du Centre Culturel Francais.			X
British Council Library			X
British Institute in East Africa	X		
Central Clearing House For District Information and Documentation Centres.	X		
Central Reference Library/ Photographic Library/ Research Lib.	X		
Centre de Recherche d'Echange et de Documentation Universitaire (CREDU) Library.	X		
City Planning and Architecture Departmental Library.	X		
Daystar Communications		X	
East African Herbarium Library.	X		
Egerton University Library.		X	
Family Planning Association of Kenya Library.	X		
Kagumo Teachers Training College.		X	
Kenya Bureau of Standards Technical Library and Documentation Centre.	X		

	SPECIAL	ACADEMIC	PUBLIC
Kenya Forestry College Library.		X	
Kenya Industrial Research and Development Institute (KIRDI). Library and Information Services.	X		
Kenya Institute of Administration.		X	
Kenya Marine and Fisheries Research Institute.	X		
Kenya Medical Research Institute Library (KEMRI)	X		
Kenya National Archives	X		
Kenya National Assembly Library.	X		
Kenya National Library Service.			X
Kenya Polytechnic Library.		X	
Kenya Posts and Telecommunications Corporation Central Training School.	X		
Kenya Power and Lighting Library.	X		
Kenya Reinsurance Corporation Library.	X		
Kenya Scientific Information and Documentation Centre (KENSIDOC) Library.	X		
Kenya Utalii College Library.		X	
Kenya Water Institute Library.		X	
Meat Training Centre.		X	

	SPECIAL	ACADEMIC	PUBLIC
Ministry of Energy and Regional Development Library.	X		
Moi Library, Kenyatta University.		X	
Moi University Library.		X	
Mombasa Polytechnic.		X	
National Cash Registers Kenya Ltd. Library	X		
National Environment Secretariat. The Environment Library.	X		
Organization of African Unity/ InterAfrican Bureau For Animal Resources (OAU/IBAR) Library.	X		
The Standard Newspapers Ltd. Library.	X		
UNESCO Regional Office For Science and Technology in Africa.	X		
United States International University - Africa.		X	
University of Nairobi		X	
TOTAL:	23	14	3

APPENDIX V

NUMBERS OF STAFF EMPLOYED BY LIBRARIES.

No. of Staff	1	2	3	4	5	6	7	8	9	10	11	12	13	24	33
No. of Libraries	7	19	15	8	4	8	2	3	1	4	3	1	2	1	1

40	60	99	174	280	320
1	1	1	1	1	1

APPENDIX VI

LIBRARY HOLDINGS (OTHER THAN JOURNALS)

Holdings (in thousands)	Less than 1,000	1	2	3	4	5	6	7	8	9	10	12	13	14
No. of Libraries	8	7	14	7	7	4	4	5	3	1	3	5	3	1

15	16	18	21	26	30	31	35	42	46	165	170	276	300	350	568	1m
6	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1

APPENDIX VII

TABLE SHOWING REASONS FOR COMPUTERIZATION.

REASON	To a Greater Extent	To a Great Extent	To a Moderate Extent	To a Small Extent	To no Extent	Mean Score
Staff could not cope with the work load	4	3		2		4.0
New Services were needed but library could not offer	1	5		1		3.8
Heavy staff costs in routine work		2			5	1.9
The old system was: very slow	4	2				4.6
Cumbersome	2	4		2		3.75
Inefficient	4	2	1	1		4.1
Unable to cope with demand	3	3		1	1	3.75
Irritating to users	3	1		2	2	3.1

APPENDIX VIII.

TABLE SHOWING USES AND EFFECT OF COMPUTERIZATION IN LIBRARIES.

USES	To a Greater Extent	To a Great Extent	To a Moderate Extent	To a Small Extent	To no Extent	Mean Score
It helps me do my job better	6	2		1		4.4
It assists with communication	4	3		1		4.25
Information for decision-making	4	6				4.4
Information overload	2	3		1		4.0
Speeding up routine operations	7			2		4.3
We need fewer staff	1				6	1.6
It has measured up to our expectations	5	3	1	1		4.2

APPENDIX IX

TABLE SHOWING IMAGE HELD ABOUT COMPUTERS (COMPUTERIZED LIBRARIES).

Attribute	To a Greater Extent	To a Great Extent	To a Moderate Extent	To a Small Extent	To no Extent	Mean Score
It was welcome	8	2				4.8
With fear		2		3	2	2.3
Staff thought they would loose their jobs					7	1.0
Staff thought they might not learn how to use the computer.		3	1	1	2	2.7

APPENDIX X

REASONS FOR NEGATIVE FEELINGS TOWARDS THE COMPUTER (COMPUTERIZED LIBRARIES).

Negative Feeling	To a Greater Extent	To a Great Extent	To a Moderate Extent	To a Small	To no Extent	Mean Score
Lack of knowhow	1	2	1		3	2.7
Fear of loss of job					7	1.0
Fear of loss of prestige/status		2		3	3	1.8
Inability to learn new technology		4	3		3	2.4
Resistance to change		2		1	3	1.8

APPENDIX XI

NEED FOR COMPUTERIZATION (PLANNING GROUP)

a) Special Libraries

NEED	To a Greater Extent	To a Great Extent	To a Moderate Extent	To a Small Extent	To no Extent	Mean Score
Staff cannot cope with the current work load	2	12	1		2	3.7
Need to offer new services	7	10	1		2	4.0
The current system is:						
slow	3	5	2	2	3	3.2
Cumbersome	5	4	2	1	3	3.5
Inefficient	3	4	2	2	5	2.9
Unable to cope with demand	2	9	2	2	1	3.6
Irritating to users	1	4	2	1	6	2.5
Heavy Staff costs associated with routine duties.	1	2	1	3	9	1.9

b) Academic Libraries

NEED	To a Greater Extent	To a Great Extent	To a Moderate Extent	To a Small Extent	To no Extent	Mean Score
Staff cannot cope with the current work load	2	5	3			3.9
Need to offer new services	9	2	1	1		4.5
The current system is:						
Slow	3	3	4		1	3.6
Cumbersome	1	4		1	2	3.1
Inefficient	2	2		2	2	3.0
Unable to cope with demand	4	4			1	4.1
Irritating to users	1	2	2	2	1	3.0
Heavy staff costs associated with routine duties	5	2	1	1	2	3.6

c) Public Libraries.

NEED	To a Greater Extent	To a Great Extent	To a Moderate Extent	To a Small Extent	To no Extent	Mean Score
Staff cannot cope with the current work load		1			1	2.5
Need to offer new services	1	1				4.5
The current system is:						
Slow			1			3.0
Cumbersome				1		2.0
Inefficient				1	1	1.5
Unable to cope with demand		1		1		3.0
Irritating to users					1	1.0
Heavy staff costs with routine duties		1	1			3.5

APPENDIX XII.

ANALYSIS OF VARIANCE (ANOVA).

The analysis of variance was calculated following the steps outlined below.

1. Let n = number of observations

Y_{ij} = response of the j th unit in the i th sample

T_i and $\bar{T}$ = total and mean respectively for the observations in the i th sample

p = number of samples

2. Total ss = SST + SSE

$$\text{where Total SS} = \sum_{i=1}^p \sum_{j=1}^{n_i} Y_{ij}^2 - CM$$

$$\text{and } CM = \frac{\left(\sum_{i=1}^p \sum_{j=1}^{n_i} Y_{ij} \right)^2}{n} = n\bar{y}^2$$

CM denotes correction for the mean

$$3. \quad SST = \sum_{i=1}^p \frac{T_i^2}{n_i} - CM$$

4. $SSE = \text{Total SS} - SST$

5. $MSE = \frac{SSE}{n-p} = s^2$

6. $MST = \frac{SST}{p-1}$

7. To test the null hypothesis

$$H_0 : \mu_1 = \mu_2 = \dots = \mu_p,$$

MST is compared with MSE using the F statistic based upon $v_1 = p-1$ and $v_2 = n - p$ degrees of freedom.

If $F = \frac{MST}{MSE} > F_x,$

where F_x is the critical value of F, based on $(p - 1)$ and $(n - p)$ degrees of freedom, for probability of a type 1 error, α , then the null hypothesis is rejected.

N.B.

SST = Sum of squares for treatments

MSE = Mean square for error

MST = Mean square for treatments

SSE = Sum of squares for error

Total SS = Total sum of squares.

APPENDIX XIII.

IMAGE HELD ABOUT COMPUTERS (PLANNING GROUP).

a) Special Libraries

Descriptors	To a Greater Extent	To a Great Extent	To a Moderate Extent	To a Small Extent	To no Extent	Mean Score
With keenness	11	7		2		4.3
With fear		1	1	3	11	1.5
With indifference	1	2		1	11	1.7

b) Academic Libraries

	To a Greater Extent	To a Great Extent	To a Moderate Extent	To a Small Extent	To no Extent	Mean Score
With keenness	7	5	1			4.5
With fear			1	4	4	1.6
With indifference			1	3	5	1.5

c) Public Libraries

	To a Greater Extent	To a Great Extent	To a Moderate Extent	To a Small Extent	To no Extent	Mean Score
With keenness	2	1				4.6
With fear				1	2	1.0
With indifference				1		1.0

APPENDIX XIV

MEASUREMENT OF THE NEED VARIABLE FOR THE NON-COMPUTERIZED LIBRARIES.

A. BY TYPE OF LIBRARY.

a) Special Libraries.

STATEMENT	To a Greater Extent	To a Great Extent	To a Moderate Extent	To a Small Extent	To no Extent	Mean Score
Staff can cope with work	7	14	7			2.0
Able to offer all services	3	17	6	2		2.3
Current system is:						
Slow		8	1	2	5	2.8
Cumbersome		4	3	3	4	2.5
Inefficient		3	2	3	5	2.2
Able to cope with demand	4	7	10			2.3
No complaints from users	4	8	8	1	2	2.5

b) Academic Libraries

STATEMENT	To a Greater Extent	To a Great Extent	To a Moderate Extent	To a Small Extent	To no Extent	Mean Score
Staff can cope with work	7	5		1	1	1.9
Able to offer all services	4	6	1	1		1.9
Current system is:						
Slow		4		1	2	2.8
Cumbersome		2	1		2	2.6
Inefficient		2		1	3	2.2
Able to cope with demand	6	3	3		1	2.0
No complaints from users.	4	6	1			1.7

c) Public Libraries

STATEMENT	To a Greater Extent	To a Great Extent	To a Moderate Extent	To a Small Extent	To no Extent	Mean Score
Staff can cope with work	3		1			1.5
Able to offer all services	3		1			1.5
Current system is:						
Slow			2		1	2.3
Cumbersome				1	1	1.5
Inefficient				1	1	1.5
Able to cope with demand	3	1				1.2
No complaints from users	4			1		1.6

B. BY SIZE OF THE LIBRARY

a) LIBRARIES WITH LESS THAN 20,000 VOLUMES.

STATEMENT	To a Greater Extent	To a Great Extent	To a Moderate Extent	To a Small Extent	To no Extent	Mean Score
Staff can cope with work	17	18	6	2	1	1.9
Able to offer all services	10	20	9	2	1	2.1
Current system is:						
Slow		9	4	4	9	2.5
Cumbersome		5	4	4	14	2.4
Inefficient	1	4	4	5	8	3.7
Able to cope with demand	12	15	9		2	2.1
No complaints from users.	12	14	8	4	3	
GRAND MEAN						2.4

b) LIBRARIES WITH MORE THAN 20,000 VOLUMES.

STATEMENT	To a Greater Extent	To a Great Extent	To a Moderate Extent	To a Small Extent	To no Extent	Mean Score
Staff can cope with work		3	1	1		3.6
Able to offer all services			2	1		2.3
Current system is:						
Slow		4				4.0
Cumbersome		3	2			3.6
Inefficient		1		3		3.5
Able to cope with demand			4		1	3.4
No complaints from users		1	2		1	3.3
GRAND MEAN						3.4

APPENDIX XV

IMAGE HELD ABOUT COMPUTERS (NON-COMPUTERIZED)*

a) Special Libraries

Descriptors	To a Greater Extent	To a Great Extent	To a Moderate Extent	To a Small Extent	To no Extent	Mean Score
Computers are too expensive	8	12	3		1	4.1
A computer is a many handed clerk	3		3	6	5	3.6
It is capable of doing almost anything	2	4	2	5	9	3.7
We do not need computers in Kenya	1	3	3		10	2.2
Computers will cut down on available jobs	5	5	3		7	3.1

*The responses to the second and third statement were reversed for tabulation purposes.

b) Academic Libraries.

Descriptors	To a Greater Extent	To a Great Extent	To a Moderate Extent	To a Small Extent	To no Extent	Mean Score
Computers are too expensive	7	1		1	1	4.2
A computer is a many handed clerk			3	3	2	3.9
It is capable of doing almost anything	1	1	3	2	1	3.1
We do not need computers in Kenya			3	1	3	2.0
Computers will cut down on available jobs.		1	4	1	1	2.7

c) Public Libraries.

Descriptors	To a Greater Extent	To a Great Extent	To a Moderate Extent	To a Small Extent	To no Extent	Mean Score
Computers are too expensive	2	1	2			4.0
A computer is a many handed clerk			2		2	4.0
It is capable of doing almost anything	1	1	2			2.75
We do not need computers in Kenya	1	1	1		1	3.25
Computers will cut down on available jobs		1		1	2	2.0

F - DISTRIBUTION TABLE.

TABLE J The F distribution

Degrees of freedom in the numerator are recorded at the top of the table, and the degrees of freedom in the denominator are indicated at the sides. The first listed or smaller value is the value on the F scale to the right of which lies 0.05 of the area under the curve. The second listed or larger value is the value on the F scale to the right of which lies 0.01 of the area under the curve.

ϕ_n degrees of freedom (numerator)

ϕ_n	1	2	3	4	5	6	8	10	12	16	20	30	40	50	100	ϕ_n
1	161 4.052	200 4.999	216 5.403	225 5.625	230 5.764	234 5.859	239 5.981	242 6.056	244 6.106	246 6.169	248 6.208	250 6.258	251 6.286	252 6.302	253 6.334	1
2	18.51 98.49	19.00 99.00	19.16 99.17	19.25 99.25	19.30 99.30	19.33 99.33	19.37 99.36	19.39 99.40	19.41 99.42	19.43 99.44	19.44 99.45	19.46 99.47	19.47 99.48	19.47 99.48	19.49 99.49	2
3	10.13 34.12	9.55 30.82	9.28 29.46	9.12 28.71	9.01 28.24	8.94 27.91	8.84 27.49	8.78 27.23	8.74 27.05	8.69 26.83	8.66 26.69	8.62 26.50	8.60 26.41	8.58 26.35	8.56 26.23	3
4	7.71 21.20	6.94 18.00	6.59 16.69	6.39 15.98	6.26 15.52	6.16 15.21	6.04 14.80	5.96 14.54	5.91 14.37	5.84 14.15	5.80 14.02	5.74 13.83	5.71 13.74	5.70 13.69	5.66 13.57	4
5	6.61 16.26	5.79 13.27	5.41 12.06	5.19 11.39	5.05 10.97	4.95 10.67	4.82 10.27	4.74 10.05	4.68 9.89	4.60 9.68	4.56 9.55	4.50 9.38	4.46 9.29	4.44 9.24	4.40 9.13	5
6	5.99 13.74	5.14 10.92	4.76 9.78	4.53 9.15	4.39 8.75	4.28 8.47	4.15 8.10	4.06 7.87	4.00 7.72	3.92 7.52	3.87 7.39	3.81 7.23	3.77 7.14	3.75 7.09	3.71 6.99	6
7	5.59 12.25	4.74 9.55	4.35 8.45	4.12 7.85	3.97 7.46	3.87 7.19	3.73 6.84	3.63 6.62	3.57 6.47	3.49 6.27	3.44 6.15	3.38 5.98	3.34 5.90	3.32 5.85	3.28 5.75	7
8	5.32 11.26	4.46 8.65	4.07 7.59	3.84 7.01	3.69 6.63	3.58 6.37	3.44 6.03	3.34 5.82	3.28 5.67	3.20 5.48	3.15 5.36	3.08 5.20	3.05 5.11	3.03 5.06	2.98 4.96	8
9	5.12 10.56	4.26 8.02	3.86 6.99	3.63 6.42	3.48 6.06	3.37 5.80	3.23 5.47	3.13 5.26	3.07 5.11	2.98 4.92	2.93 4.80	2.86 4.64	2.82 4.56	2.80 4.51	2.76 4.41	9
10	4.96 10.04	4.10 7.56	3.71 6.55	3.48 5.99	3.33 5.64	3.22 5.39	3.07 5.06	2.97 4.85	2.91 4.71	2.82 4.52	2.77 4.41	2.70 4.25	2.67 4.17	2.64 4.12	2.59 4.01	10
11	4.84 9.65	3.98 7.20	3.59 6.22	3.36 5.67	3.20 5.32	3.09 5.07	2.95 4.74	2.86 4.54	2.79 4.40	2.70 4.21	2.65 4.10	2.57 3.94	2.53 3.86	2.50 3.80	2.45 3.70	11
12	4.75 9.33	3.88 6.93	3.49 5.95	3.26 5.41	3.11 5.06	3.00 4.82	2.85 4.50	2.76 4.30	2.69 4.16	2.60 3.98	2.54 3.86	2.46 3.70	2.42 3.61	2.40 3.56	2.35 3.46	12
13	4.67 9.07	3.80 6.70	3.41 5.74	3.18 5.20	3.02 4.86	2.92 4.62	2.77 4.30	2.67 4.10	2.60 3.96	2.51 3.78	2.46 3.67	2.38 3.51	2.34 3.42	2.32 3.37	2.26 3.27	13
14	4.60 8.86	3.74 6.51	3.34 5.56	3.11 5.03	2.96 4.69	2.85 4.46	2.70 4.14	2.60 3.94	2.53 3.80	2.44 3.62	2.39 3.51	2.31 3.34	2.27 3.26	2.24 3.21	2.19 3.11	14
15	4.54 8.68	3.68 6.36	3.29 5.42	3.06 4.89	2.90 4.56	2.79 4.32	2.64 4.00	2.55 3.80	2.48 3.67	2.39 3.48	2.33 3.36	2.25 3.20	2.21 3.12	2.18 3.07	2.12 2.97	15
16	4.49 8.53	3.63 6.23	3.24 5.29	3.01 4.77	2.85 4.44	2.74 4.20	2.59 3.89	2.49 3.69	2.42 3.55	2.33 3.37	2.28 3.25	2.20 3.10	2.16 3.01	2.13 2.96	2.07 2.86	16

TABLE J The F distribution (continued) ϕ_n degrees of freedom (numerator)

ϕ_d	1	2	3	4	5	6	8	10	12	16	20	30	40	50	100	ϕ_d
17	4.45 8.40	3.59 6.11	3.20 5.18	2.96 4.67	2.81 4.34	2.70 4.10	2.55 3.79	2.45 3.59	2.38 3.45	2.29 3.27	2.23 3.16	2.15 3.00	2.11 2.92	2.08 2.86	2.02 2.76	17
18	4.41 8.28	3.55 6.01	3.16 5.09	2.93 4.58	2.77 4.25	2.66 4.01	2.51 3.71	2.41 3.51	2.34 3.37	2.25 3.19	2.19 3.07	2.11 2.91	2.07 2.83	2.04 2.78	1.98 2.68	18
19	4.38 8.18	3.52 5.93	3.13 5.01	2.90 4.50	2.74 4.17	2.63 3.94	2.48 3.63	2.38 3.43	2.31 3.30	2.21 3.12	2.15 3.00	2.07 2.84	2.02 2.76	2.00 2.70	1.94 2.60	19
20	4.35 8.10	3.49 5.85	3.10 4.94	2.87 4.43	2.71 4.10	2.60 3.87	2.45 3.56	2.35 3.37	2.28 3.23	2.18 3.05	2.12 2.94	2.04 2.77	1.99 2.69	1.96 2.63	1.90 2.53	20
25	4.24 7.77	3.38 5.57	2.99 4.68	2.76 4.18	2.60 3.86	2.49 3.63	2.34 3.32	2.24 3.13	2.16 2.99	2.06 2.81	2.00 2.70	1.92 2.54	1.87 2.45	1.84 2.40	1.77 2.29	25
30	4.17 7.56	3.32 5.39	2.92 4.51	2.69 4.02	2.53 3.70	2.42 3.47	2.27 3.17	2.16 2.98	2.09 2.84	1.99 2.66	1.93 2.55	1.84 2.38	1.79 2.29	1.76 2.24	1.69 2.13	30
40	4.08 7.31	3.23 5.18	2.84 4.31	2.61 3.83	2.45 3.51	2.34 3.29	2.18 2.99	2.07 2.80	2.00 2.66	1.90 2.49	1.84 2.37	1.74 2.20	1.69 2.11	1.66 2.05	1.59 1.94	40
50	4.03 7.17	3.18 5.06	2.79 4.20	2.56 3.72	2.40 3.41	2.29 3.18	2.13 2.88	2.02 2.70	1.95 2.56	1.85 2.39	1.78 2.26	1.69 2.10	1.63 2.00	1.60 1.94	1.52 1.82	50
60	4.00 7.08	3.15 4.98	2.76 4.13	2.52 3.65	2.37 3.34	2.25 3.12	2.10 2.82	1.99 2.63	1.92 2.50	1.81 2.32	1.75 2.20	1.65 2.03	1.59 1.93	1.56 1.87	1.48 1.74	60
80	3.96 6.96	3.11 4.88	2.72 4.04	2.48 3.56	2.33 3.25	2.21 3.04	2.05 2.74	1.95 2.55	1.88 2.41	1.77 2.24	1.70 2.11	1.60 1.94	1.54 1.84	1.51 1.78	1.42 1.65	80
100	3.94 6.90	3.09 4.82	2.70 3.99	2.46 3.51	2.30 3.20	2.19 2.99	2.03 2.69	1.92 2.51	1.85 2.36	1.75 2.19	1.68 2.06	1.57 1.89	1.51 1.79	1.48 1.73	1.39 1.59	100
150	3.91 6.81	3.06 4.75	2.67 3.91	2.43 3.44	2.27 3.14	2.16 2.92	2.00 2.62	1.89 2.44	1.82 2.30	1.71 2.12	1.64 2.00	1.54 1.83	1.47 1.72	1.44 1.66	1.34 1.51	150
200	3.89 6.76	3.04 4.71	2.65 3.88	2.41 3.41	2.26 3.11	2.14 2.90	1.98 2.60	1.87 2.41	1.80 2.28	1.69 2.09	1.62 1.97	1.52 1.79	1.45 1.69	1.42 1.62	1.32 1.48	200
400	3.86 6.70	3.02 4.66	2.62 3.83	2.39 3.36	2.23 3.06	2.12 2.85	1.96 2.55	1.85 2.37	1.78 2.23	1.67 2.04	1.60 1.92	1.49 1.74	1.42 1.64	1.38 1.57	1.28 1.42	400
1000	3.85 6.66	3.00 4.62	2.61 3.80	2.38 3.34	2.22 3.04	2.10 2.82	1.95 2.53	1.84 2.34	1.76 2.20	1.65 2.01	1.58 1.89	1.47 1.71	1.41 1.61	1.36 1.54	1.26 1.38	1000
∞	3.84 6.64	2.99 4.60	2.60 3.78	2.37 3.32	2.21 3.02	2.09 2.80	1.94 2.51	1.83 2.32	1.75 2.18	1.64 1.99	1.57 1.87	1.46 1.69	1.40 1.59	1.35 1.52	1.24 1.36	∞

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SELECTED BIBLIOGRAPHY.

- Agha, S.J. "Library Automation in Nigeria: Achievements and Constraints on Progress". Program, Vol.20 (4), 1986. pp. 409-414.
- Aldrich, H.E. "Technology and Organizational Structure: A Reexamination of the Findings of the Aston Group" Administrative Science Quarterly, Vol.17, 1972. pp. 26-43.
- Anglin, R.V. "Computer Commandments" Library Journal, Vol.109 (16) 1984. pp. 1821-1822.
- Annual Review of Information Science and Technology.
New York, Knowledge Industry Publications, 1966 -
- Argyris, C. Intervention Theory and Method.
Reading, Mass.: Addison-Wesley, 1970.
- Atkinson, H. "Personnel Savings Through Computerized Library Systems". Library Trends. April, 1975.
- Axford, H.W. "The Great Rush to Automated Catalogs: Will it Be Management or Muddling Through?" in Gore, D., J. Kimbrough and P. Spyers-Duran, eds. Requiem For the Card Catalog: Management Issues in Automated Cataloguing. London: Aldwych Pr., 1979.
- Bagley, D.E. and E. Pyston. Automation in a Polytechnic Library: Fifteen Years' Development at Hatfield. London: Library Association, 1982.

Becker, J. and R.M. Hayes. Handbook of Data Processing for Libraries. New York: Wiley, 1970.

Bhimani, Nazlin. "Automation At the University of Western Ontario Libraries: A Review". Program, Vol.20 (3) 1986. p.320-322.

Blackburn, R.H. "Management Experience With COM Catalogs In a Large Academic Library" in Gore et al. eds.

Blunden-Ellis, John. "A Market Study of Library Automation Systems In the UK" Program, Vol. 21 (4), 1987. pp. 317-332.

Boss, R.W. The Library Manager's Guide To Automation. White Plains, N.Y.: Knowledge Industry Publications 1979.

British Council. Information Technology in Libraries, Course 662, 7-25 Sept. 1986, Sheffield / London. (Unpublished).

Brown, J.A.C. The Social Psychology of Industry. Penguin, 1954.

Butler, B. "Collection and Resource Data Bases in Bibliographic Management" in Gore et al.

Byrn, J.H. "Automation in University Libraries: The State of the Art" Library Resources and Technical Services, Vol.13, 1969. pp. 520-530.

Cart, M. "Caveats, Qualms, and Quibbles: Revisionist View of Library Automation" Library Journal, Vol.112(2), 1987. pp.38-41.

- Clayton, Marlene. Managing Library Automation.
Aldershot: Gower, 1987.
- Collier, Mel. Review Article of R.W. Boss.
Telecommunication For Library
Management. White Plains, N.Y.: 1985
in Program, Vol.21(1), 1987. p.83.
- Daniel, W.W. and J.C. Terrell. Business Statistics:
Basic Concepts and Methodology. 3d. ed.
Boston: Houghton Mifflin, 1983.
- Day, M.P. "Electronic Publishing and Academic
Libraries". British Journal of Academic
Librarianship, Vol.1(1), 1986. pp.53-70.
- Dolby, J.L. et al. Computerised Library Catalogues:
Their Growth, Cost, and Utility.
Cambridge, Mass.: MIT Pr., 1969.
- Eaton, John and J. Smithers. This is IT: A
Manager's Guide to Information
Technology. Oxford: Allan, 1982.
- Encyclopaedia of Library and Information Science.
New York: Dekker, 1968-1986.
- Epstein, Susan Baerg. "Libraries & Systems:
Automation Dreams Versus Reality"
Library Journal, Vol.III (15), 1986.
pp. 66-67.
- Freedman, M.J. "Technology Options For a Developing
Country". Paper Presented at the
Kenya Library Association Seminar held
in Nairobi, 24-26 February, 1988.
- Gabor, F. "(Social Psychological Aspects of the
Application of Computer Technology in
Library Work)" tr. Citatel, Vol.31(9),
1982. pp.312-313.

- Gapen, D.K. and I.T. Morita. "OCLC at OSU: the Effect of the Adoption of OCLC on the Management of Technical Services At a Large Academic Library" Library Resources and Technical Services. Winter, 1978. pp. 5-21.
- Goossens, Paula. "Report on the European Library Automation Group Meeting At the National Library of Spain, Madrid, 23 - 25 April, 1986". Program, Vol.20(4) 1986. pp. 420-422.
- Gore, D., J. Kimbrough and P. Spyers-Duran, eds. Requiem For the Card Catalog: Management Issues in Automated Cataloguing. London: Aldwych Pr., 1979.
- Hammer, D.P. "Automated Operations in a University Library: A Summary". College and Research Libraries, Vol.26, 1965. pp. 19-29, 44.
- Hanson, Jo Ann. "A Model of Organization of the Automated Academic Library". Technicallities, Vol.2(10), 1982. pp. 7-8.
- Harvey, E. "Technology and the Structure of Organizations". American Sociological Review, Vol.33, 1968. pp.247-259.
- Henley, J.P. Computer - based library and Information Systems. 2nd ed. London: Macdonald, 1972.
- Herring, James E. and J.A. Mackenzie. Planning For Library Automation: Aberdeen City Libraries. London: Library Association, 1986.
- Holgate, Elizabeth and J. Lenton. "Planning for Automation: Catalogue Use Survey at Humberside College of Higher Education" Program, Vol.20(1) 1986, pp.77-81.

- Horny, Karen L. "Fifteen Years of Automation: Evolution of Technical Services Staffing. Library Resources and Technical Services, Vol.31(1), 1987. pp.60-68.
- Hunter, E.J. Computerized Cataloging. London: Bingley, 1985.
- Iversen, G.R. and H. Norpoth. Analysis of Variance. Beverly Hills, Calif.: Sage Publications, 1976.
- Jackson, Sidney L. Libraries and Librarianship in the West: a Brief History. New York: McGraw-Hill, 1974.
- Johnnson, Peggy. "Planning a COM Catalog for the St. Paul Campus Libraries". Library Resources and Technical Services, Vol.31(1), 1987. pp. 77-87.
- Johnson, Elmer D. History of Libraries in the Western World. 2nd ed. Metuchen, N.J. Scarecrow Pr., 1970.
- Jones, Ken. "Librarianship To-day: Some Uncomfortable Realities". Maktaba, Vol.7(1) 1980 (1982). pp.58-67.
- Kent, A. Library Planning For Automation. Washington, D.C.: Sparton Books, 1965.
- Kimbrough, J. "Editorial Note" in Gore et al. eds.
- Koenig, Michael E.D. "Information Systems Technology: On Entering Stage III". Library Journal, Vol.112(2), 1987. pp. 49-54.
- Kountz, J. "Shelf-List Conversion: Management Pitfalls and Opportunities" in Gore et al. eds.

- Kraus, J.W. "Prologue to Library Co-operation"
Library Trends, Vol.24, 1975-1976.
- Library Association Report of Working Party,
1981-2. Impact of New Technology on
Libraries and Information Centres.
London: Library Association, 1982.
- Library Technology Centre. State of the Art of
the Applications of New Information
Technologies in Libraries and Their
Impact on Library Functions in the
United Kingdom. London: Library and
Information Technology Centre, 1987.
- Lieberman, M.A., G.J. Selig and J.J. Walsh.
Office Automation: A Manager's Guide
For Improved Productivity, New York:
Wiley, 1982.
- Lovecy, Ian. Automating Library Procedures: a
Survivor's Handbook. London: Library
Association, 1984.
- Luker, K. and R.S. Runyan. "Computers: Equipment
and Services" Library Trends, Vol.24,
1975-76. pp.651-671.
- Luquire, Wilson. "Attitudes Toward Automation /
Innovation in Academic Libraries"
Journal of Academic Librarianship,
Vol.8(6), 1983. pp. 344-351.
- McLean, Neil. "Current Library Automation Research
Supported by the British Library"
Program, Vol.20(1) 1986. pp.71-74.
- Marsterson, William. Information Technology and
the Role of the Librarian. London:
Croom Helm, 1986.

- Martel, C. & M. Untawale. "Work Enrichment For Academic Libraries." Journal of Academic Librarianship, Jan. 1983. pp.339-343.
- Martin, S.K. and B. Butter, eds. Library Automation: the State of the Art. Chicago: ALA, 1975.
- Mason, Robert M. "Human Resources and the Micro System" Library Journal, Vol. 110(5), 1985. pp. 44-45.
- Massil, S.W. "Automation, Appropriate Technology and Appropriate Information System". Program Vol.16(1), 1982.
- Matanji, Peter. Implementation of Automated Housekeeping Systems in Academic Libraries in Kenya. Monash University, 1986. (Unpublished)
- Matthews, J.R. Choosing An Automated Library System. Chicago: ALA, 1980.
- _____. "Competition & Change: the 1983 Automated Library System Marketplace". Library Journal, Vol.109, May 1, 1984. pp.853-860.
- Mendenhall, W. and J.E. Reinmuth. Statistics For Management and Economics. 2d ed. North Scituate, Mass: Duxbury Pr., 1974.
- Mohr, L.B. "Organizational Technology and Organizational Structure" Administrative Science Quarterly, Vol.16, 1971. pp.444-459.
- Moon, Brenda. "Co-operative Networks and Service to the Scholar: University Library Resources For On-line Research". British Journal of Academic Librarianship, Vol.1(1), 1986. pp.41-52.

- Mulwa, Joseph M. Managing Change In Automation: Issues In the Automation of Circulation Control With Special Reference to the University of Nairobi Library, Kenya. M. Lib. Thesis. Aberystwyth: College of Librarianship, Wales, 1987. (Unpublished).
- Muriuki, M. "Classification and Subject Cataloguing in Kenya". International Cataloguing, Vol.13(4) 1984. pp.39-41.
- Njuguna, J.R. Comp. & Ed. Directory of Libraries in Kenya. Nairobi: Gazelle Books, 1977.
- Nyren, Karl. "ONLINE Atlanta:Tiptoeing Through the Automation Minefields". Library Journal, Vol.110(5), 1985. pp. 27-30.
- Parker, D. "Problems and Prospects in Library Computerisation: University Libraries" Tasmania School of Librarianship. Occasional Paper Series: Present Problems and Prospects in Library Computerisation. Hobart, University of Tasmania, 1981. pp.9-26.
- Plaiser, J.M. "Cooperation in England". Library Trends, Vol.24, 1975/76. pp. 417-423.
- Plemnek, N.K. Using Computers in Academic Libraries Nauchnye i Tekhnicheskie Biblioteki SSSR (4), 1983. pp.27-31.
- Richardson, Ian S. "A Library Computing Strategy For the Future: a Personal View From Lancaster University" Program, Vol.21(1) Jan. 1987. pp.49-55.
- Robins, Kate, Comp. Subject Guide to Information Sources in Kenya. Nairobi: Kenya Library Association, 1984.

Rochell, Carlton C. "The Next Decade: Distributed Access to Information" Library Journal, Vol.112(2), 1987. pp. 42-48.

Rohrback, P.T. FIND: Automation at the Library of Congress: The First Twenty Five Years and Beyond. Washington, D.C.: Library of Congress, 1985.

Rowley, J.E. Computers For Libraries. 2nd ed. London: Bingley, 1985.

Salmon, S.R. Library Automation Systems. New York: Dekker, 1975.

Samuelson, K., H. Borko and G.X. Amey. Information Systems and Networks. Amsterdam: North-Holland Pub. Co., 1977.

Schuman, Patricia Glass. "Library Networks: a Means, Not An End; the Truth Behind the Myths" Library Journal, Vol.112(2), 1987. pp.33-37.

Scott, R. Computers For Developing Countries. Nairobi: East African Publishing House, 1971.

Skender, Dubravka and Mirna Wilber. "Computer - based Library Systems in the National University Library, Zagreb". Program, Vol.20(1), 1986. pp. 82-85.

Spyers-Duran, P. "The Effects of Automation on Organizational Change, Staffing, and Human Relations in Catalog Departments" in Gore et al.

"Key Issues in Managing the Automated Catalogue: A Panel Discussion". in Gore et al.

- Stebbins, K.B. Personnel Administration in Libraries. 2nd ed. Scarecrow Pr., 1966.
- Taylor, F.N. The Principles of Scientific Management. New York: Norton, 1967.
- Taylor, D.R.F. and Obudho, R.A. eds. The Computer and Africa: Applications, Problems and Potential. New York: Praeger Publishers, 1977.
- Tedd, L. An Introduction to Computer-based Library Systems. London: Heyden, 1977.
- _____ An Introduction to Computer-based Library Systems. 2nd ed. Chichester: Wiley, 1984.
- Thompson, James. A History of the Principles of Librarianship. London: Bingley, 1977.
- Were, J. Systems Analysis of the Proposed University of Nairobi Computer-based Library System. Nairobi, 1984 (Unpublished).
- _____ Systems Requirements of Computer-based Library System For University of Nairobi Library. Nairobi, Unpublished, 1986.
- Woods, Rollo G. "Library Automation in British Universities" Program, Vol. 20(4), 1986. pp. 359-381.