

**DESIGNING A COMPUTER-BASED CIRCULATION CONTROL SYSTEM:  
WITH REFERENCE TO THE NEEDS OF THE UNIVERSITY OF ZAMBIA LIBRARY**

by

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in partial fulfilment of the requirements for the  
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(M.Lib.) under Alternative Regulations

College of Librarianship Wales

Aberystwyth

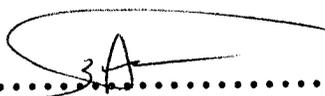
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## ABSTRACT

In this study a case for the automation of circulation control is made. The philosophy of circulation control is presented. A circulation control model upon which various manual-based and computer-based systems are compared for effectiveness, is developed. A general review of the environment of the automation of circulation control is presented. Design issues pertaining to the planning for the automation of circulation control are considered. The study also presents a case study of the manual-based circulation control system of the University of Zambia Library where a case for automation of its circulation function is made. It ends with an outline of the hardware configuration of the proposed UNZA CIRC system.

**DECLARATION**

This work has not been accepted in substance for any degree, nor is it being submitted in candidature for any degree other than Magister of Scientia Bibliothecaria in the University of Wales

  
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**STATEMENT OF ORIGINALITY**

The concept, research, organisation and writing of this dissertation is entirely that of the candidate, SAUL FLOYD CHADZANSO ZULU. It has been carried out at the College of Librarianship Wales, Aberystwyth, under the supervision of E. Michael Keen, M.Sc., F.L.A., M.I.Inf.Sc.

All quotations are distinguished and identified by references.

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## TABLE OF CONTENTS

	PAGE
Abstract	i.
Declaration	ii.
Statement of Originality	ii.
Acknowledgements	iii.
Table of Contents	iv.-vi.
List of Figures and Tables	vii.
List of Abbreviations	viii.-ix.
Introduction	x.-xiii.
 <b>CHAPTER ONE: THE ENVIRONMENT OF AUTOMATION OF CIRCULATION CONTROL: USE OF COMPUTERS IN LIBRARIES</b>	
1.1 Introduction	1- 2
1.2 The Computer: Hardware and Software Aspects	2
1.2.1 Introduction	2- 3
1.2.2 Computer: Hardware	3- 9
1.2.3 Computer: Software	9-13
1.2.4 Summary on Computer Hardware and Software	13-14
1.3 Historical Overview of Library Automation	14-18
1.4 Justification for Library Automation	18-22
1.5 Benefits of Library Automation	22-23
1.6 Problems of Automation	23-25
1.7 Approaches to Library Automation	25-37
1.7.1 Local Approaches to Automation	26-29
1.7.2 The Co-operative Approach to Library Automation	29-37
1.8 Summary	38
References	39-41
 <b>CHAPTER TWO: FUNCTIONS OF CIRCULATION CONTROL SYSTEMS</b>	
2.1 Introduction	42
2.2 Functions of Circulation Control	42
2.2.1 Circulation Control: Function and Purpose	42-45
2.2.2 Process of Circulation Control	45-47
2.3 Model of an Ideal Circulation Control System	47-48
2.3.1 An Idealised Circulation Control System	48-49
2.4 Types of Circulation Control Systems	49
2.5 Summary	49
References	50

### CHAPTER THREE: MANUAL-BASED CIRCULATION CONTROL SYSTEMS

3.1	Introduction	51-52
3.2	Manual Non-Mechanical Systems	52
3.2.1	Ledger Systems	53-54
3.2.2	The Browne System	54-58
3.2.3	The Token Systems	58-60
3.3	Manual-Mechanical Systems	60-61
3.3.1	The Newark System	61-63
3.3.2	The McBee Keysort System	63-65
3.3.3	The IBM Charge Card	65-66
3.3.4	Photographic Systems	66-68
3.4	Summary on Manual Systems	68-69
	References	70

### CHAPTER FOUR: COMPUTER-BASED CIRCULATION CONTROL SYSTEMS

4.1	Introduction	71-72
4.2	Justification for Automation of Circulation Control	72-74
4.3	Benefits of Automation of Circulation Control	74-75
4.4	Goals of Automated Circulation Control	75-77
4.5	Problems of Computer-based Circulation Control Systems	77-79
4.6	Approaches to the Automation of Circulation Control	79
4.7	Modes of Operation of Computer-based Circulation Control Systems	79-86
4.7.1	Batch-operated Circulation Control Systems	80-82
4.7.2	On-line Real-time Systems	83-86
4.8	Types of Computer-based Circulation Control Systems	86-87
4.8.1	Absence Systems	87-89
4.8.2	Inventory Systems	89-91
4.8.3	Batch-operated Absence Systems	91-92
4.8.4	Batch-operated Inventory Systems	92-94
4.8.5	On-line Real-time Absence Systems	94-95
4.8.6	On-line Real-time Inventory Systems	95-98
	References	99-100

### CHAPTER FIVE: DESIGN CONSIDERATIONS

5.1	Introduction	101-102
5.2	Design Issues	102-109
5.2.1	Hardware/Software Considerations	102-103
5.2.2	Type of System	103
5.2.3	Record Structure	103-104
5.2.4	Implementation	104-105
5.2.5	Costing the System	105-107
5.2.6	Commitment of the Funding Authority to the Project	107
5.2.7	Impact of Automation on the Organisation	107-109
5.3	Summary	110
	References	111

**CHAPTER SIX: UNZA LIBRARY: ANALYSIS OF THE CURRENT CIRCULATION CONTROL SYSTEM**

6.1	Introduction	112
6.2	The University of Zambia: Historical Outline	112-113
6.2.1	Mission of the University	113
6.2.2	Constituent Institutions	115-116
6.2.3	Governance of the University	116-117
6.2.4	Student Population	117
6.3	UNZA Libraries	118-143
6.3.1	Organisation	118-119
6.3.2	Governance	119-120
6.3.3	Role of the University Libraries in the University	120-122
6.3.4	Users of the University Libraries	122-123
6.3.5	The Collection and Organisation of Circulation Control	123-132
6.3.6	The Volume of Circulations	
6.3.7	The Circulation Control Systems	135-137
6.3.8	Problems of the Current Manual-based Circulation Control Systems	137-140
6.3.9	Justification for the Automation of the UNZA Library	140-142
	References	143

**CHAPTER SEVEN: ENVIRONMENT OF THE AUTOMATION OF THE UNZA LIBRARY CIRCULATION CONTROL SYSTEM**

7.	Introduction	144
7.1	Use of Computers in Zambia	144-145
7.2	The University of Zambia	145
7.3	Computer-based Libraries in Zambia	145-146
7.4	Use of Computers in UNZA Libraries	146-149
	References	150

**CHAPTER EIGHT: THE PROPOSED UNZA CIRC SYSTEM**

8.1	Introduction	151
8.2	Objectives of the Proposed System	152
8.3	The System	152-155
8.3.1	The UNZA CIRCLU	153-154
8.3.2	UNZA CIRCNO	154
8.3.3	UNZA CIRCNO	155
8.4	Outline of the Proposed System	155-156

BIBLIOGRAPHY	157-161
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APPENDIX	162-168
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## LIST OF FIGURES AND TABLES

FIGURE		PAGE
1	The Computer System	4
2	Program Translation Using an Assembler or Compiler	11
3	Program Translation Using an Interpreter	12
4	SWALCAP Structural Links with Member Libraries	37
5	Basic File Updating in Batch Mode	81
6	Basic File Updating in On-line Real-time Mode	84
7	File Structure of an Absence System	88
8	File Structure of an Inventory System	90
9	Integrated on-line circulation control system	98
10	Zambia: Location of University of Zambia Campuses	114
11	UNZA Libraries Organisational Structure	119
12	RSD Organisation Chart	124
13	The UNZA CIRC System	156

## TABLE

1	Risks Involved in Installation of Automated Systems Vs. Revised Manual Process	25
2	University of Zambia Student Population	117
3	Users of the University Libraries	122
4	Normal Loans 1976-85	133
5	Circulations at the SLC	133
6	Serials Circulations 1979-1985	134

## LIST OF ABBREVIATIONS/ACRONYMS

AACR2	- Anglo-American Cataloguing Rules, 2nd ed.
BBIP	- British Books in Print
BIP	- Books in Print
CD-ROM	- Compact Disk-Read Only Memory
CPU	- Central Processing Unit
DP	- Data Processing
EMMA	- Extra MARC Materials (or Records)
IBM	- International Business Machines Corporation
ICL	- International Computers Limited
Id.	- Identification
ILL	- Inter-Library Loans
ISBN	- International Standard Book Number
ISSN	- International Standard Serials Number
LC	- Library of Congress
MARC	- Machine Readable Cataloguing
OCR	- Optical Character Recognition
OPAC	- Online Public Access Catalogue
OS	- Operating System
RAM	- Random Access Memory
ROM	- Read Only Memory
RSD	- Readers Services Division
SCD	- Special Collection Division
SLC	- Short Loan Collection
SLCD	- Serial and Law Collection Division
U.K.	- United Kingdom
UNZA	- University of Zambia
UNZA CIRC	- University of Zambia Library Circulation Control System

UNZA CIRCLU - University of Zambia Library Circulation Control  
System Lusaka

UNZA CIRCNO - University of Zambia Library Circulation Control  
System Ndola

UNZA CIRCNO - University of Zambia Library Circulation Control  
System Solwezi

UNZA Libraries/  
Library - University of Zambia Libraries

UNZA-NET - University of Zambia Libraries Online Network

U.S./U.S.A. - United States of America

VDU - Visual Display Unit

## INTRODUCTION

### 1 Purpose of the Study

Library processes involve a lot of repetitive routines of which the creation, maintenance, and consultation of records is central to their modus operandi. All things being equal, in a manual-based system an increase in activity in any of ~~of~~ the principal areas of library operation, e.g. cataloguing; acquisition and book ordering; circulation control, and; serials control, results in a corresponding increase in the number of repetitive routines, creation, maintenance and consultation of records. And if productivity is to be maintained at the same levels of output, a corresponding increase in personnel, other inputs such as stationery, filing cabinets, etc. have to be made available. Failure to do so may result in system breakdown which manifests itself in degradation to service especially at such service points as issue desks. Herein lies the basic weakness of manual-based systems: their inability to cope with increased volumes of activity. It is because of this inability by manual systems to cope with exceptional conditions that librarians have increasingly been adopting computer technology in place of manual systems. In this study a case is made for the adoption of computer technology for circulation control processes. In particular, this study examines a case study of the University of Zambia Library circulation control system, with suggestions of how the library could computerise its circulation control operations.

### 2 Justification for the Study

Although this study is exploratory in content, it, however, provides a basis upon which more detailed studies of circulation control systems with view to computerisation can be made. This is

particularly true of the University of Zambia Library where no similar studies have been undertaken before.

### 3 Scope and Limitation

As alluded to in 0.2 above, this study lacks in depth and specificity. The coverage of the analysis of manual-based circulation control systems is limited to seven systems, while the discussion on computer-based systems does not look at any particular system either past (e.g. the IBM 357 data collection unit of the 1950s and 1960s), or currently in operation (e.g. BLCMP's CIRCO, SWALCAP's shared system, etc.) but instead concentrates on their structure and modes of operation (e.g. whether they are inventory or absence systems; on-line or batch-operated systems, etc.). And the survey of the case study is based mainly on the activities of the Main Library of the Lusaka Campus.

### 4 Definition of Terms

To avoid confusion over the meaning of certain terms used in this study we define some of the common ones. The following terms are used interchangeably:

- 'UNZA Library' and 'UNZA Libraries'
- 'computerisation' and 'automation'
- 'computerise' and 'automate'
- 'issue desk' and 'circulation desk'
- 'manual-based system' and 'manual system'
- 'computerised', 'computer-based', and 'automated'
- 'date due' and 'due date'

These and other concepts that appear in the study are defined in substance where they appear in the text.

## 5 Methodology

The study was undertaken by use of both published and unpublished literature. These are acknowledged in a footnote wherever they have been used. The case study on the UNZA Library is partly based on the author's personal knowledge of the institution as well as the research questionnaire (see Appendix) which the library kindly answered in full.

The method of analysis of the circulation control systems described in Chapters 3-4 has been influenced largely by the works of Underwood and Freedman:

1. Peter G. Underwood, "Public library service statistical data: the influence of circulation control methods on its collection and analysis". (F.L.A. Thesis, The Library Association, London 1977).
2. Maurice J. Freedman, Circulation systems past and present, Journal of Library Automation, 14 (December 1981), 278-285.

## 6 Organisation of the Study

This study is presented in eight chapters each of which examines an aspect of circulation control as follows. In Chapter 1 we review the environment of the automation of circulation control, where a general outline of the trends in library automation is presented; Chapter Two looks at the philosophy of circulation control and in this chapter we develop a model of an ideal circulation control system upon which the various manual and computer-based circulation control systems discussed in Chapters 3 and 4 are compared for effectiveness; Chapter 3 examines manual-based circulation control systems; Chapter 4 examines the computer-based circulation control systems; in Chapter 5 we present some of the design issues to be taken into consideration when planning for the automation of circulation control, in Chapters 6-8 we present an analysis of our case study, the UNZA Library

circulation control system with a suggestion (albeit in outline form) on how the library could computerise its circulation control function.

## CHAPTER ONE

### THE ENVIRONMENT OF AUTOMATION OF CIRCULATION CONTROL: USE OF COMPUTERS IN LIBRARIES

#### 1.1 Introduction

An examination of the four principal areas of library activity:- acquisition, cataloguing, serials control, and circulation control; will reveal that their operations involve a lot of creation, consultation and maintenance of records. Because of this necessity of having to create and maintain records in the course of discharging their functions, librarians have increasingly been confronted with problems of record keeping. And in a bid to overcome these problems they have, over the years, devised various systems of operation, of which the rich variety of manual-based systems used in circulation control discussed in chapter 3, is but one such example.

The importance of good record keeping in any undertaking cannot be over emphasised. Indeed, poor record keeping can negatively affect both the administration of the library and the library's ability to provide a satisfactory service to its patrons. Although other factors such as poor funding, inadequate qualified personnel, etc., could also play a role to this end. It is not surprising, therefore, that when the computer was invented and its technology was sufficiently developed for library applications, librarians were quick to recognise the potentials it offered in solving their data processing problems. In this chapter we examine the use of computers in libraries with emphasis on reasons for adopting computer

technology for library operations and approaches to library automation. We also hope that the chapter will provide, albeit in general terms, the background information on the environment in which automation of circulation control is taking place. To begin with, we review computer hardware and software.

## 1.2 The computer: Hardware and Software aspects

### 1.2.1 Introduction

Meek and Fairthorne define a computer as:-

"... a machine capable of receiving, storing, manipulating and yielding up information"<sup>1</sup>

Halton sees a computer simply as:

"... a machine for the automatic processing of information..."<sup>2</sup>

It is interesting to note that both definitions emphasise the fact that the computer processes information as opposed to the earlier notion of a computer being used mainly for doing numerical computations.

There are basically three types of computers. They are:

- (a) Mainframe computers - these are large computers with very high processing speeds and have very large core memory storage capacities measured in millions of characters. Mainframe computers are expensive and are used mainly in centralised computing centres serving large organisations with a lot of data processing activities;
- (b) Mini computers (or minis) - these have basically the same features as their mainframe brethren only they are smaller both physically and in terms of slower processing speeds, and smaller core storage capacities measured from thousands of characters to millions of characters. Minis are cheaper in price than mainframes and are usually located in decentralised areas of an organisation such as departments, although in certain smaller organisations minis may be used to provide centralised computing services to the whole organisation;

- (c) Microcomputers (or micros) - the smallest in the family of computers - they are smaller than minis and mainframes in terms of both physical and memory core sizes. In terms of cost, they are cheaper and are located in offices, particular workstations or even in homes (as personal computers). Various companies specialise in manufacturing these various types of computers, although there are some such as IBM which manufacture all types✓

Libraries and information units currently employ all three types of computer hardware mentioned above. Mainframe computers are used mostly by libraries which use their parent organisation's main computer installation. Mainframes are also used by libraries engaged in co-operative ventures such as OCLC cataloguing centre in Ohio (USA). They are also used by libraries to access bibliographic data bases which are mounted on mainframes. Minis are used by libraries which operate their own computer systems, and where the mini may be used exclusively for library operations. With the increasing availability of more powerful microcomputers with capabilities similar to those of minis, micros are finding increased usage in library and information units. In smaller libraries, they may provide an integrated computing services. And in bigger libraries they may be used to perform certain specific functions such as circulation control, short loan collection management etc. or as a back-up facility. The choice by libraries of any type of computer is determined by the use they want to employ it for. Price considerations are, of course, always important.

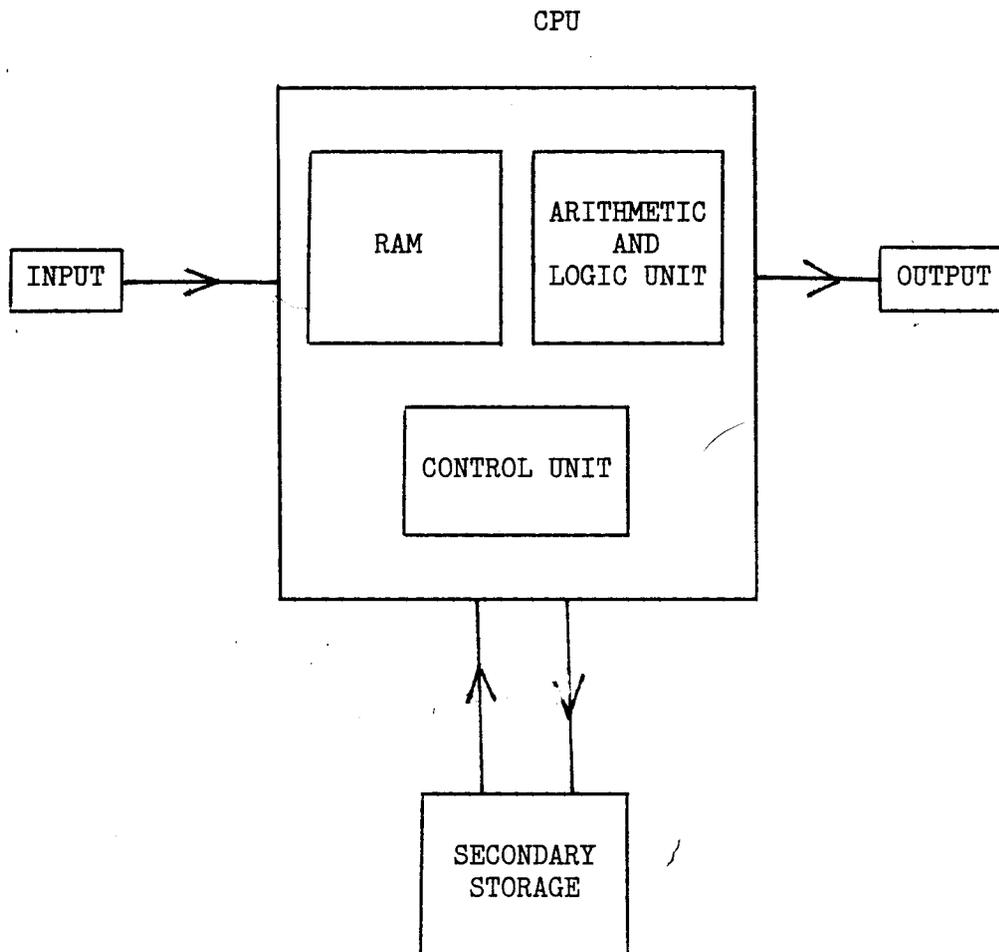
### 1.2.2 Computer: Hardware

The term 'computer system' is used to describe a computer central processing unit (CPU), input/output (I/O) devices and secondary storage devices. The diagram below illustrates a computer system and its four basic components:

1. Input;
2. CPU;
3. Output and;
4. Secondary storage devices.

**Figure 1**

**Computer System**



SOURCE: John Kirkham, "Data storage systems", in New information technology; ed. Alan Burns. Computers and Their Applications. (Chichester: Ellis Horwood, 1984) p.25.

**1.2.2.1 Central Processing Unit**

The CPU is the heart of a computer system. It is within the CPU that all the processing is executed. Within the CPU there are three specialised components which as a 'team' carry out all the processing

routines. These are the Random Access Memory unit (RAM); the Arithmetic and Logic unit and; the Control unit.

### The RAM unit

The RAM unit acts as the 'storehouse' of the CPU. It provides temporary storage for data and instructions sent from the Control unit awaiting processing by the Arithmetic/Logic unit. The size of the RAM measured in thousands of bytes (Kilobyte or KB) or millions of bytes (megabytes or MB), determines how much data a given computer can handle at any given time. The larger the capacity, the more data a computer can handle. The RAM provides very high speed access to data stored in its memory. After the Arithmetic/Logic unit has processed a given set of data and the output device is temporarily occupied it can send the data to the RAM for temporary storage until the output device is free. In the world of computers the 'temporarily occupied' time may be measured in fractions of a second. The RAM is a highly volatile storage area because once power is disconnected from the computer after a prolonged period, the information stored on the RAM is erased from the RAM and cannot be recovered when the power is restored, unless it had been transferred to a secondary storage medium.

### The Arithmetic/Logic Unit

The Arithmetic/Logic unit is the part of the CPU that carries out the actual computations and all the data processing that is required on a given set of data. Data processing/computation is done at very high speeds measured in characters per second. Depending on the size of the computer (mainframe, mini or micro) the processing speeds range from several hundred thousand characters per second (for micros) to several hundred million characters per second for super-speed

computers of the CRAY-I<sup>3</sup> class. The other determining factor of processing speed is the word length which the CPU can process at a time. Word lengths are measured in bits - a row of binary digits represented by zeros and ones and represents the signals in which communication with a digital computer is done. Eight such bits make one byte. Word lengths range from 4-bit, 8-bit, 16-bit, 32-bit to 64-bit. The bigger the word length the faster the processing speed.

### The Control Unit

The control unit as the name implies, does just that, it controls all the operations in the CPU. It coordinates the activities of both the RAM and the Arithmetic/Logic units. It instructs the RAM where in its (RAM) memory address to search for (or store) a given set of data or instructions and where to send it; it also instructs the Arithmetic/Logic unit on what data to fetch from or store into the RAM and what to do with it. Besides coordinating the activities within the CPU, the control unit also coordinates the receiving and sending of data and instructions (or messages) from input devices to the CPU and from the CPU to the output devices. Analogous to the job the control unit does is a scene of a policeman controlling and directing traffic on a junction of a very busy highway. The CPU of a very busy computer facility would be interacting with hundreds of users operating from different terminals sending and receiving messages to and from the computer in an interactive mode. The job of the control unit is to coordinate the receiving and sending of these messages between the CPU and users. It does all these functions at extremely high speeds measured in thousandths or millionths of a second, such that each user interacting with the CPU gets the feeling that only they are using the computer.

These three basic components of the CPU (RAM, Arithmetic/Logic, and Control unit) are normally located within the same device. The other devices: the input, output and secondary storage units need not necessarily be in the same geographical area as the CPU. But for convenience, secondary storage devices such as disk or tape drives are normally located in the same room as the CPU.

#### 1.2.2.2 Secondary Storage Unit

The secondary storage unit(s) serve as a back-up storage for the CPU. Secondary storage devices are used because the storage within the CPU is usually of limited capacity and is used by the CPU as 'working space' for the temporary storage of data to be processed. These units are usually high capacity storage devices of up to several hundred million characters. There are many different types of secondary storage media ranging from high capacity magnetic disks, magnetic tapes, Compact Disk Read Only Memory disks (CD-ROM) and Floppy disks with capacities of up to several hundred million characters (for mainframe or mini-based devices), to relatively low capacity media such as the 5 $\frac{1}{4}$ " floppy and hard disks, magnetic tape and cassettes with capacities ranging from several thousands to several millions of characters (for micro-based devices).

Secondary storage devices, such as disk/tape drives may be permanently connected to the CPU to facilitate data transfer to or from the various media noted above. These devices are also used to input data into the CPU and the CPU may search for data on tapes or disks mounted on these devices. They may also be used as output units by the CPU by loading the output onto storage media mounted on these devices.

Secondary storage units offer more permanent storage of data as opposed to the CPU's temporary storage facilities of the RAM. This is so in the sense that once data is stored on a secondary storage media, it will remain there until it is erased. It does not get erased when power is disconnected from the storage device.

#### 1.2.2.3 Input unit

The input device provides the interface between the human operator inputting data and the CPU receiving or sending the data to the human operator. It receives data and/or instructions in human language and translates it into machine language (i.e., electronic signals or bits in series of zeros and ones which the computer understands) before transmitting it to the CPU. An input device may take the form of a keypad with alphabetic, numeric and other characters and symbols similar to a typewriter keys; a light pen, bar, code or OCR (optical character recognition) reader; a barcoding or OCR machine. The more sophisticated devices utilise touch-sensitive screens, while voice input devices are still in their developmental stages.

An input device may be connected in on-line interactive mode with the CPU during data preparation and transmission, or it may operate in batch mode. Operating in batch mode may involve first punching a deck of data cards off-line using a card punch and then transmitting the data on punched cards to the computer on-line using a card reader. Alternatively, data may be keyed onto tape using a tape data recorder and then 'reading' the data to the computer using a tape reader. Here, the tape data recorder (or punch card machine) performs the function of translating the data from human language to machine language, and the card/tape reader becomes the intermediary between the CPU and the deck of cards or data tape.

#### 1.2.2.4 Output unit

The output unit receives and displays the output from the CPU. This is done by either printing out or displaying, graphically, the output on a visual display unit (VDU) screen. Output may also be loaded on a non-visual media such as magnetic tapes, disks, cassettes etc. Essentially what an output device does is to translate data received in machine language from the CPU back to a human recognisable form.

Sometimes the input and output units may be contained in one physical unit, such as a terminal consisting of a VDU unit with keypad and screen. And touch-sensitive screen terminals may be used for both input and output functions.

#### 1.2.3 Software

'Software' is a general term used to describe many different types of programs or lists of instructions which enable the computer to carry out the necessary processing on a given set of data.<sup>4</sup> Forgetting robotics and remote control techniques for the time being, software is to the computer what a driver is to a car, if the latter is to move from one point to another.

There are basically two broad types of software (i.e., computer programs): those that are always resident in the computer, known as systems software; and software that is loaded into the computer to perform user-specified tasks, known as applications software.<sup>5</sup>

Perhaps one other general characteristic of software that needs mentioning here, is that while hardware prices and the cost of computing in general have been falling over the years, software prices have continued to rise. Indeed, software now accounts for up to 80% or more of the total cost of a computer system. The reason

for this is that while the production of computer circuits is a highly mechanised and automated process, software development is an intellectual activity needing human labour. And labour costs are always on the increase.

#### 1.2.3.1 Systems Software

Systems software are those programs which enable the computer to function and control its operations. Systems software is usually pre-written into the system (CPU) by the manufacturers of the computer equipment, although it can also be obtained from software houses which specialise in making both systems and applications software. There are three basic types of systems software: programming languages translators; utility programs and; operating systems.

#### Programming Language Translators

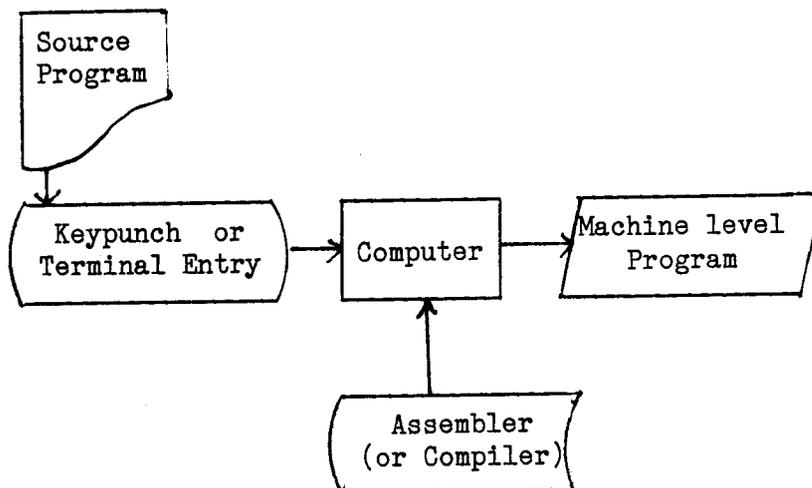
In order for a computer to execute a task on a given set of user-defined instructions (applications programs and data), which are presented in high-level languages (very similar to human language and symbols), the messages containing the instructions and data must be transmitted to the computer in a form it understands. As mentioned elsewhere in the preceding sections, the computer understands messages in 'machine language' only. In Machine language each number, letter, symbol, or punctuation mark is represented by a binary code with zeros and ones. In order to facilitate the translation process whenever a program and data are loaded onto a computer, special translation programs have been developed. These programs are usually developed by the manufacturer of the computer equipment and are resident within the computer's CPU. These (translation) programs makes it much easier to run jobs or develop programs on computers.

Three types of such programs are used on most systems. They are known as Compilers, Assemblers, and Interpreters.

All these three programs perform the same basic function of translating programs written in high-level languages (such as FORTRAN, PASCAL, COBOL etc.) into a low-level machine language (zeros and ones). For each of these programs to work, the source program (to be translated) should also be written in the same language as the translating program (Compiler, Assembler or Interpreter). For instance, a program written in a high-level language such as FORTRAN, will need a FORTRAN-based compiler to translate it into machine language. It may not work if, for instance, a PASCAL-based assembler is used. The diagram below illustrates how assemblers and compilers work:<sup>6,7</sup>

Figure 2

Program Translation using an Assembler or a Compiler



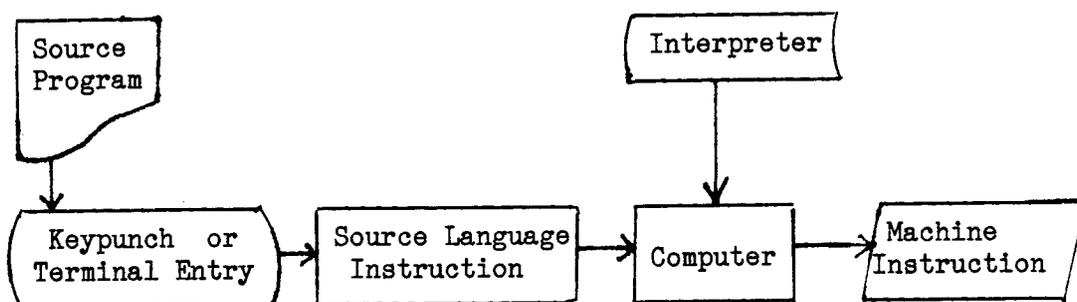
SOURCE: William Saffady, Introduction to automation for librarians. (Chicago: American Library Association, 1983), pp.41, 43.

An interpreter program works in a slightly different way from the above two. While compilers and assemblers translate the entire source program before execution, the interpreter translates the

individual program instructions. The diagram below illustrates how this is done:<sup>8</sup>

Figure 3

Program Translation using an Interpreter



SOURCE: William Saffady, opcit. p.43.

Utility Programs

Utility programs (or utilities) perform functions which are commonly used by most users of a computing facility. They perform, among others, the following functions: sorting data into various orders; editing; copying data from one medium to another (e.g. from punched cards to magnetic disks or tape; removing data from active storage on-line to an off-line media); merging data etc. Like other systems software, utilities are obtained from the computer equipment manufacturers, and they can also be purchased from software houses.<sup>9</sup>

Operating Systems

The Operating System (OS), also variously known as 'Executive Systems' 'Systems Monitor' plays a function similar to that of the CPU's Control Unit: it controls all other programs operating in the computer. It supervises, controls and coordinates the activities of translation programs; receives applications software in high-level language and directs them to the appropriate part of the CPU for translation and execution. Certain types of OS are equipment

specific - they can only work on particular types of computer equipment. And like utilities and translator programs, OS usually comes already preprogrammed into the CPU's special Read Only Memories (ROM) by the manufacturer. OSs can also be obtained from software houses.

The OS also determines the range of applications software that can be run on a given computer. Modern OS are very sophisticated with multi-user (i.e., ability to handle more than one user at the same time) and multi-tasking (i.e., the ability to execute many different jobs running on different programs from many workstations (terminals) at the same time).

#### 1.2.3.2 Applications Software

'Applications software' is a general term used to describe various types of programs that are used to execute user-specified tasks. Applications software can be developed in-house by the computer facility's programmers and systems analysts, or they can be purchased from software vendors fully developed and ready to run. And software can be geared to perform a single application e.g. circulation control; or it can be an integrated package containing a suite of programs catering (interactively) for many applications, e.g. circulation control, cataloguing, acquisitions and book ordering, public information etc., can all be contained in one suite (or package) of programs.

#### 1.2.4 Summary on Computer Hardware and Software

In the preceding sections we have discussed computer hardware and software. That a computer system is made up of different components each performing a specialised function vital to the overall working of the computer: input and output devices which are used for sending

and receiving messages to and from the computer, respectively; the CPU as the heart of the computer is responsible for doing all the required computations or processing a given user specified task might require and; secondary storage units which are used by the CPU to store or access vast amounts of data that cannot be kept in the CPU's own limited but busy core storage area. And that in order for the computer to execute user-specified tasks, it needs software or programs which are lists of instructions which tells the computer exactly what to do. That there were two basic types of computer software: that which is always resident within the CPU and controls the internal working of the CPU, known as systems software; and that which is loaded on the computer to perform specific user-specified tasks, known as applications software.

### 1.3 Historical Overview of Library Automation

Bierman defines library automation simply as:

"... the use of computers to aid library processes..."

And further adds that library automation could be viewed from two angles:

"... at one end of the spectrum, library automation can be viewed as the use of the computer and associated technology to do exactly what has always been done in libraries (with the justification of reduced cost and/or increased performance;... and library automation can be viewed as the use of the computer and associated technology to revolutionize the meaning of libraries and to define their existence...<sup>10</sup>"

These two views of library automation accurately summarise the two functions of library automation in the 1980s and beyond. The first aspect relates to using computers for library housekeeping functions; and the second relates to the necessity of the library to keep abreast of the changing trends on the information provision scene, such as changes in the acquisition and use of information by end-

users. Examples include the emergence of on-line database vendors capable of providing directly to the end-user not only surrogates to documents containing information, but the actual full-texts of the required information instantly, and; trends in electronic publishing which will, in a few years time, result in certain types of essential information being available in electronic form only, (or at least current information will appear in electronic form first before being published in hard copy).

The history of library automation over the last three decades has passed through three major (but overlapping) phases characterised by:

1. the 'crude' stand-alone batch-operated systems of the 1960s;
2. the co-operative bibliographic utilities on-line systems of the 1970s, and;
3. the turn-key, stand-alone on-line systems of the 1980s.

The early systems of the 1960s were pioneered and dominated by the big university and research libraries. Although computing costs had fallen somewhat in the 1960s, computers were, however, still very expensive for most libraries. Further, software for general library applications was not yet developed during this period. And libraries which were experimenting with computers either had enough resources of their own to purchase their own hardware and develop library systems in-house or; they had access to the computing facilities of their parent organisations. The systems developed were for single function only (e.g. circulation only), although other libraries tried to develop sophisticated integrated library systems (e.g. Universities of Chicago, Northwestern and their NOTIS system (Northwestern On-line Total Integrated System) and Stanford

University's BALLOTS system (Bibliographic Automation of Large Library Operations using a Time-sharing System)).<sup>11</sup>

Although the 1960s saw a general fall in computing costs computers during this period were, however, still very expensive for most individual libraries. The formation of computer-based library co-operatives and consortia such as OCLC, WLIN (in the U.S.A.), and BLCMP, SWALCAP (in the U.K.), to name but a few, beginning in the late 1960s through the 1970s, was done to cushion libraries against having to bear the high costs of computerisation on their own. It was realised within library circles that by pooling resources through a co-operative or consortium (of libraries) they could share the costs of developing library systems and with this arrangement no library needed to bear the costs of developing the system all by themselves. Although not all libraries joined co-operatives, a good majority did and the 1970s saw the formation of local, regional and national library networks providing shared on-line systems. For instance, beginning in the early 1970s OCLC, one of the most successful library co-operatives in the U.S. started offering a range of on-line cataloguing services to its members. Later OCLC services were expanded to include interlibrary loans (ILL). Other organisations elsewhere, notably in the U.K. such as BLCMP and SWALCAP followed the same pattern. OCLC, BLCMP and SWALCAP are discussed in richer detail in the section on 'The Cooperative Approach to Library Automation'.

According to De Gennaro, four major developments of the early 1970s fostered the growth of shared on-line systems. They are:<sup>12</sup>

1. the introduction of the first cheap and powerful minicomputers;
2. the coming of sophisticated on-line systems;

3. the development of powerful telecommunication capabilities, and significantly;
4. the emergence and acceptance of the MARC format as a standard library cataloguing format.

The development of powerful on-line and telecommunications capabilities provided the technological means through which cooperative ventures could be effected. And the introduction of cheaper but powerful minicomputers made it possible for clusters of libraries to form local co-operatives which were linked with the larger centralised services of such centres as OCLC; while the acceptance of the MARC format as the standard cataloguing format facilitated the exchange of information between libraries.

The 1970s also saw the entry on the library automation scene of commercial vendors of minicomputer-based turnkey library systems of which CL Systems Inc. (CLSI) was one of the pioneers.<sup>13</sup> And the trends in the 1980s have shown a move away from centralised shared systems provided by library co-operatives to turnkey stand-alone systems provided by commercial turnkey vendors. Three factors have been largely responsible for this trend:

1. the continuing fall in computer prices and the introduction of more powerful microcomputers with an increasing range of software geared to library applications.
2. Turnkey vendors have grown and consolidated their position on the library automation market. For instance, they are now producing better quality products such as OPACs (Online Public Access Catalogues) at very competitive prices.
3. While the costs of computing having shown a remarkable downward trend over the years, it has not been so with telecommunication charges which have continued to rise. This has made the benefits of cooperation less attractive.

De Gennaro provides a good summary on the major trends on the historical development of library automation as he writes on past, current, and likely future developments:

"The first decade, the 1960s, was dominated by primitive local systems. The second decade, the 1970s, was dominated by large multitype and multipurpose library networks. The current and third decade, the 1980s, will be dominated by a return to local systems. But this time they will be sophisticated multifunction turnkey systems on and microcomputers; and they will have linkages to a variety of library and commercial networks on large mainframes. Large libraries dominated library automation in the 1960s, the bibliographic utilities and services networks dominated it in the 1970s and commercial vendors will dominate it in the 1980s.<sup>14</sup>

#### 1.4 Justification for Library Automation

Libraries being service institutions, cannot base their reasons for automation of their functions solely on economic grounds. Indeed, one of the obvious and immediate implications of automation is the huge capital outlay requirements associated with it. Libraries usually operate in environments of stiff competition between departments for scarce financial resources from the same funding agency. And if they are to get the necessary financial support for their automation plans, they must show the funding authority that it will be a worthwhile investment.

Reasons for library automation can be grouped into five major areas:<sup>15,16</sup>

1. Improvements to reader services;
2. Aid to better library management;
3. Reducing the increasing rate of library operational costs;
4. Pre-requisite for cooperative ventures, and of increasing importance;
5. Pre-requisite for access to current information.

## 1. Improvements to reader services

A computer-based library system results in the provision of improved and expanded services to users. For instance, a computer-based circulation control system can ensure that borrowing limits of library materials are effectively enforced, thereby ensuring a fairer distribution of library resources to readers; and readers are served very quickly at the issue desk, and; accurate overdue/recall notices can be efficiently produced and sent to readers, thereby helping them to become aware of their obligations to other readers who might want to use the library items they might be holding. Further, computer produced periodical and short loan collection lists can be easily made and distributed in various locations of the library, with the effect of enhancing reader access to library collections. And a computer-based cataloguing and acquisition system can be used to provide a current awareness service through an effective SDI (Selective Dissemination of Information) service for books, services and other library materials to both the general reader and to specialised groups.

## 2. Aid to Better Library Management

Automation of library processes results in the provision of more complete and accurate records which can aid in the better management of library resources. As alluded to in the introduction to the chapter, accurate and complete records are very important for acquisition, cataloguing, serials and circulation control functions. Further, an automated library system ensures an efficient record creation process in the sense it cuts out multiple record creation for the same item (a characteristic feature of manual systems), because once a record is created at the acquisition process, when say a book is ordered, the same record can be transferred electronically

to the cataloguing, circulation and public information modules at little extra cost.

And well kept records can be an important source of management information. Statistics and other management reports which an automated system can provide at little extra cost can be used for both planning and evaluation of the services the library is providing. For instance, statistics on acquisitions can show the trends in the purchasing of library materials, by vote of departments, by subject area, etc., and imbalances in the acquisitions can be corrected using this information, and; statistics from circulation control can provide the library with information on collection use or lack of, and decisions on: purchasing extra copies of those heavily used items; increasing manning levels at issue desks at peak service periods during the day, week or term during an academic year (for academic libraries); weeding and stack management; and review of the library's loan policy if it is found, for instance, that users are constantly violating a given loan period, can all be based on statistics from the system. All these factors are very crucial to a better management of a library's service.

### 3. Reducing the Increasing Rate of Library Operational Costs

Although library automation does not usually result in direct financial gains to the library, studies<sup>17,18,19</sup> have shown that there are savings to be gained in library operational costs where automated services have been installed. For instance, an automated system eliminates the need for filing and multiple record creation and; stationery costs associated with manual-based systems are eliminated (although these are replaced by those required by an automated system). Above all, although automation does not necessarily result

in staff reductions, it does, however, eliminate the need for more personnel even when faced with increased volumes of work, e.g. an increase in the volume of circulations or purchase orders can be easily handled by a computer at little or no extra cost.

#### 4. Pre-requisite for Co-operative Ventures

A computer-based library system is now a pre-requisite for effective participation in local, regional, national or international co-operative ventures. Computer-based co-operative ventures such as OCLC have proved very successful in such efforts as shared cataloguing and interlibrary loans.

#### 5. Pre-requisite for Access to Current Information

Simpson<sup>20</sup> has predicted that one of the megatrends of the future in information provision is that, what he calls 'HIGH VALUE' information (financial, business, economic trends, scientific and technological information), will be available only in electronic form and that access to these sources of information will depend on whether the library is equipped with the appropriate technology. Indeed, certain types of publications such as the periodical World Cultures, are available in electronic form only. And if libraries are to maintain their traditional roles as the major providers of information, they have to acquire the requisite technology through which users can access information stored in electronic form. Failure to do this, other providers of information will take over this function. This scenario has already come into play with libraries being increasingly challenged by new arrivals on the information arena of commercial bibliographic and full-text database vendors such as BRS, DIALOG, WORLD REPORTER, etc., who are providing information direct to the end-user. If libraries do not adjust to these new methods of

acquiring and providing information they risk losing their relevancy to both their clientele and parent organisations and may soon become 'information dinosaurs'.

#### 1.5 Benefits of Library Automation

Mays, reporting on the automation of Deakin University Library's acquisition function, found the automated system installed to have the following advantages over the manual system it had replaced:<sup>21</sup>

- Extra services to users, such as accessions lists, accessible copies of the Order File, course reading lists, etc.
- A neater and less error-prone data entry and correction cycle;
- Staff savings on filing and unfiled operations;
- Creation of additional management information and the automatic accumulation of the management information, which was at the time collected manually such as commitment figures and expenditure figures;
- Clearer lines of communication between the Library and the Finance Branch regarding library expenditure and;
- Creation of machine-readable records with the possibility of links to cataloguing and circulation.

And Raitt has identified the following specific benefits of library automation:<sup>22</sup>

- It offers flexibility in operation
- Speeds up processing and work-flow
- Makes for greater accuracy, efficiency, consistency and improved work control
- Creates job satisfaction and interests and improves morale
- Reduces unit cost of work
- Reduces mindless, repetitive clerical chores
- Allows maintenance of only one master record

- Affords better record protection
- Consolidates input by eliminating multiple data entry and reformatting
- Permits improved budget control
- Enables enhancement of staff throughput and productivity and increases their availability for extra tasks
- Allows maintenance and updating of mailing lists and label generation
- Enables improved exception reporting

### 1.6 Problems of Automation

From the discussions in the preceding sections it is obvious that computer-based systems have many advantages over manually operated systems. But even with these advantages automation is a risky undertaking. Although computer-based systems are not fraught with problems, it is important that we are aware of some of them. As noted in the introduction to the preceding section, automation projects involve huge capital investments and which if it failed would result in immediate financial loss to the library. And the library would certainly have a hard time justifying another request for additional funds from its parent institution for purchasing another system.

Perhaps the biggest weakness of automated systems is that they are susceptible to a complete failure. For instance, if a computer is down (i.e. not functioning), then all processes dependent on it cannot operate. Such a breakdown would seriously impair services to users. Boss<sup>23</sup> and Tedd<sup>24</sup> have identified four major types of problems that can arise from automated systems. They include:

1. Problems associated with inadequate computer hardware and/or software. The problems associated with hardware could range from the acquisition of wrong hardware due to poor system specifications; the hardware supplier failing to deliver equipment on schedule; to the library being stranded with a system that cannot be serviced or upgraded because the supplier has left the computer market. And software problems could arise from poor system design, testing, or implementation by the system vendor or local personnel (if it is designed in-house);
2. Inadequate funding or resources. The funding authority might decide to withdraw financial support in the middle of the project. The effect of this constraint on the library would take the form of inability to acquire appropriate hardware or software; staff training etc.;
3. People. Conflicts could develop between various parties involved in the project or affected by it. This could be due to lack of proper communication between the concerned parties or the usual resistance to change;
4. Organisational changes. Automation usually results in changes in the way both the organisational units and procedures and tasks within the units are done.

Some of these problems could be prevented or at least alleviated with good fore planning.

In the table below Boss summarises some of the problems associated with the implementation of automated systems compared to manual-based systems:

Table 1

Risks Involved in Installation of Automated Systems  
vs. Revised Manual Process

	MANUAL	AUTOMATED
1. Understanding Technology	Easy	Difficult
2. Developing Specifications	Informal	Precise formal process
3. Project Management	Simple to instal	Difficult to control, time, and cost
4. Converting and Installing	Easy	Major changes, much training
5. Impact on Organization	Minimal	Significant, often involves behaviour change
6. Flexibility	Easy to change quickly	Difficult, costly and time-consuming to modify

SOURCE: Richard W. Boss, The library manager's guide to automation (White Plains, N.Y.: Knowledge Industry, 1979), p.68

1.7 Approaches to Library Automation

There are basically two approaches to library automation: the local and the co-operative approach. The major differentiating factor between the two is the type of data they handle. While local systems:

"... rely essentially on their own [library's] data or that bought for merging into their own files...",<sup>25</sup>

co-operative systems handle data and files from various libraries.

Choice of any one approach will depend on many factors such as:

- the benefits the particular library making the choice perceive in a chosen approach;
- the tasks which the sought system will perform;
- current and long-term computing needs of the library, etc.

Each approach has its own merits and disadvantages. We will try and highlight some of these as we go along. To begin with we examine the local approach.

#### 1.7.1 Local Approaches to Automation

There are three ways to acquiring a locally-based automated library system. These are:

1. In-house developed systems
2. Computer bureau-based systems
3. Turnkey stand-alone systems.

##### 1.7.1.1 In-house Developed Systems

In-house developed computer-based library systems are these systems that are developed by the library through either use of the library's own staff (programmers) and computer, or use of the parent organisation's computing facilities. This approach has the following advantages:<sup>26,27</sup>

1. Control over the system. The library, if it owns the computer, retains total control over the system, and can, therefore, dictate how and when the computer may be used. This aspect is very critical especially for academic libraries which remain open till late at night, over weekends, and sometimes even during public holidays.
2. Customization. A locally developed system is likely to be more tuned to the local needs of the library.
3. No visible costs involved. If the parent organisation's computing facilities (hardware and personnel) are used in developing the system, it may be the cheapest way of automating from the library's point of view since there are no 'real' costs to the library.
4. Library gains data processing (DP) experience. The library gains experience in planning, designing and implementing computer-based systems. The system developed in-house can later be sold to other libraries as shown by the efforts of the libraries at Northwestern University and their NOTIS system, and the Virginia Tech's VTLS software.

In-house developed systems have the following disadvantages:

1. Costly. The costs associated with developing a sophisticated automated library system from scratch may be too high for most libraries' usually limited financial resources. Unless the library is well funded, it might embark on a project which it soon might have to abandon due to insufficient resources.
2. Need for DP personnel. This approach has staffing implications for staff with DP skills.
3. Lack of control over the system. If the parent organisation's computing facilities are used to develop the system, and if the library is also using the parent organisation's computer to run the system, it (library) runs the risk of being given a low priority rating by the computer centre management in favour of the organisation's administrative, academic, and scientific users (if in an academic environment). This, infact usually happens whenever the computer centre is under pressure for time on the computer from these two sources;
4. Time lag between planning and implementation. In-house-developed systems take too long to develop and implement. And by the time the system is finally developed and implemented, the computing needs of the library might have changed.

#### 1.7.1.2 Computer Bureau Approach

The bureau approach involves the use of a commercial computer bureau to provide computing services to the library for an agreed fee. Under this arrangement, all the library does is to send the relevant data that needs processing to the computer bureau. These could be purchase orders, cataloguing drafts, etc. The Library may be linked with the bureau manually by physically taking the data to and from the bureau, or through computer terminals connected on-line to the bureau via telecommunication lines. And processing and transmission of data between the library and the bureau can be done either in full on-line interactive mode or it can be a batch operated service.

The bureau approach has the following advantages:<sup>28,29</sup>

1. Less initial capital outlay required. Since all the hardware and software is provided by the computer bureau, the library does not need a huge initial capital outlay to implement the system;
2. The System can be implemented very quickly;
3. The library is indemnified against technological enhancements on hardware or software that may be required. These are taken care of by the bureau;
4. Efficient service. Because the arrangement of the service between the bureau and the library is made in a competitive environment, the library is assured of an efficient service;
6. Minimum disruption to services. The processing of materials (e.g. conversion of records) is done outside the library, there is, therefore, very little disruption to services in the library during the changeover from the old to the new system.

The bureau approach has the following disadvantages:

1. Lack of control over the system. The library cannot determine how and when to operate the bureau system. Ability to control computer usage, as discussed in the preceding section, is very critical especially in academic libraries;
2. Batch operated systems. Bureau systems are usually batch operated, and may, therefore, be only suitable for certain types of library operations. Installation of an on-line interactive system might result in increased telecommunication charges.

#### 1.7.1.3 Turnkey Approach

The turnkey approach involves the library purchasing a full package of hardware and software from a computer manufacturer or turnkey vendor. The system may be geared towards a single library application (e.g. circulation), or it may be an integrated, multi-tasking system catering for various modules of library operations.

Turnkey systems have the following advantages:<sup>30</sup>

1. The system can be installed very quickly because other than the library meeting its financial obligation to the vendor, everything else is handled by the turnkey vendor;
2. Reliability. Since turnkey systems are sold to many libraries, their capabilities are known and demonstrable;
3. System maintenance. Contracts entered into between the library and the system vendor usually include training, installation, maintenance and enhancements to the system at reasonable rates;
4. Shared system development costs. Cost for software development are much lower than in an in-house developed system because the costs are spread over the many libraries that use the turnkey system;
5. It has no DP staff implication;
6. Control over the system. The library retains total control over how and when to use the system.

And the disadvantages of turnkey systems are as follows:

1. Lack of customisation. Since the systems are purchased fully developed geared for use by many different types of libraries, they may not be suitable for certain special needs of the library. But this problem is being taken care of by the new customised systems, although this may result in higher system costs;
2. Danger of system redundancy. The library runs the risk of being stuck with a redundant system if the vendor withdraws from the market;
3. Huge capital outlay. The initial capital outlay requirements for turnkey systems are usually large.

#### 1.7.2 The Co-operative Approach to Library Automation

Resource sharing has always been part of the library scene. Librarians have long recognised the futility of attaining self sufficiency in the acquisition of library materials for their users. Perhaps libraries could afford to collect everything that was published in the Pre-Gutenberg era. But Gutenberg's movable type and the information explosion that followed in its wake, and which has

been further accelerated in the Twentieth Century, have put to rest, forever, the dream of achieving self sufficiency in library acquisitions. It is not surprising, therefore, that with the advent of the digital computer and all its capabilities, librarians were quick to recognise its potential as a tool for resource sharing.

The development of computer-based library co-operatives began in the second half of the 1960s when the use of computers in libraries was taking root in North America and the U.K.. The main objectives of these co-operatives then was to facilitate resource sharing among libraries in a bid to offset the effects of rising costs of library materials and the high costs of computing. In the last twenty years or so computer-based library co-operatives have developed from essentially batch operated cataloguing agencies into sophisticated on-line integrated systems offering a variety of services and products to libraries. For our purposes we shall examine briefly three of such library co-operatives. From the United States we shall look at OCLC, and from the U.K. we examine BLCMP and SWALCAP. First we look at some of the benefits and disadvantages of library co-operatives. Perhaps it should be pointed out that some aspects of these benefits are no longer perceived as benefits anymore as a result of the technological developments made in the last twenty years or so.

Among the perceived benefits of a library joining a library co-operative can be summarised as follows:<sup>31</sup>

1. Access to databases. The library co-operatives have created huge data bases from the input of member libraries and from bibliographic sources such as British Books in Print (BBIP), Books in Print (BIP) U.K. and LC MARC records. These databases can be accessed and searched on-line by libraries.

2. Easy data conversion. The availability of a huge database makes data conversion much easier for libraries which are changing their files from manual to machine readable form.
3. Facilitates resource sharing. The availability and access to databases facilitates resource sharing activities such as inter library loans among libraries; shared cataloguing, etc.
4. Control resides in the members. The co-operatives, because they are run and controlled by members for members are likely to respond to the needs of the members by designing better library systems.
5. Shared costs. Because costs of system development and hardware are shared among the participating members, it makes automation much cheaper to individual libraries.
6. Standardisation. Co-operatives lead to standardisation of processes and this further facilitates the transfer of data and information between libraries.

Some of the criticisms of co-operatives are as follows:

1. Lack of customisation. The design of computer-based services offered by co-operatives are to a large extent determined by the wishes of the majority of the members. Because of this, some members may be getting more or less than the services they require.
2. Telecommunications costs. Co-operatives serve libraries located in different geographical areas. This inevitably calls for the need to use special telecommunications equipment which tends to increase the cost of these services to member libraries.
3. Slow response to queries. Due to the large sizes of co-operatives and the geographical dispersion of the membership, response to queries by members is necessarily slow. Quick response time to queries for such busy service areas as circulation control is very important. But this problem is being solved by better and faster computer and telecommunications equipment which makes it possible to diagnose equipment or software problems over telephone lines.

#### 1.7.2.1 The Changing Trends in Computer-based Library Co-operatives

Perhaps the most notable trend in library co-operatives which we have alluded to elsewhere in the chapter, is that libraries are moving away from centralised shared facilities offered by co-operatives to

turnkey stand-alone systems. This trend has been caused by, among other things, the changed scenarios between that of the late 1960s when co-operatives were being formed, and the one that obtains in the 1980s. Compared to the 1960s, the conditions of the 1980s have changed as follows:

1. The cost of developing library systems has fallen. Sophisticated library application software can now be purchased relatively cheaply from software vendors.
2. The cost of hardware has fallen and most institutions can now afford to purchase their own computers. This has been made possible by the availability on the market of cheap but powerful smaller computers such as minicomputers and microcomputers.
3. While the argument for cheaper shared original cataloguing are still varied today, the same records can be obtained from other sources such as the British Library, Library of Congress, etc., at competitive prices.
4. Telecommunications costs have remained steadily high because libraries need to be linked on-line to the centralised computer facilities of the co-operatives. The situation is different with stand-alone systems which only pay for telecommunications costs only for the period they are connected to the co-operative facilities.

The implications of these trends on the future of library co-operatives are difficult to gauge. But it is interesting to note that three of the major co-operatives, OCLC, BLCMP and SWALCAP have developed turnkey stand-alone systems for sale to members and non members.<sup>32,33,34,35</sup> And one possible disadvantage of this trend away from co-operatives is that libraries using stand-alone systems will not feel compelled to send their records to the central database at the co-operative. Further, libraries 'standing alone' are not compelled to produce standardised bibliographic records. This will make the sharing of resources difficult.

#### 1.7.2.2 BLCMP (Library Services) Ltd.

BLCMP (Library Services) Ltd.,<sup>36,37</sup> formerly known as the Birmingham Libraries Co-operative Mechanization Project is a British non-profit library co-operative. It was founded in 1969 under a grant from the British Library Research and Development Department (BLR&DD), formerly the Office of Scientific and Technical Information (OSTI). In 1977 it became a self-supporting non-profit private company owned by member libraries, who are shareholders in the company. It is based at Birmingham University Library. BLCMP is the largest library co-operative in the U.K. with about 50 members including academic and public libraries and other networks such as SWALCAP and the British Library. BLCMP offered the first automated cataloguing service in the U.K. It became operational in 1972.

Currently BLCMP maintains a huge data base of over five million records which include BNB 1951-; LC catalogues 1975-; plus Extra MARC (EMMA) records contributed by member libraries since 1972, including the BLCMP Union Catalogue (contributed by members). The BLCMP database grows at an annual rate of 140,000 records. And the co-operative plans to supplement these files with the BBIP and BIP.

Among the many products and services provided by BLCMP to its members include the following:

##### 1. Cataloguing Services

Fully on-line cataloguing facilities for: record searching, capturing, creation, editing and printing. It has a tailored screen format for local library records. The standard format is for the BLCMP data base. The records can be accessed by a variety of search keys including ISBN, author, author/title, title, accession number, control numbers etc.

The catalogue output formats include paper cards and Computer Output Microform (COM). The on-line cataloguing service was introduced in 1980, when it replaced the batch-operated system which had been in use since 1972. This followed the introduction of

the BOSS (BLCMP On-line Support Service) module. BLCMP still provides batch cataloguing services.

## 2. Circulation Control

Circulation control is not provided as a shared service by BLCMP. It has a fully on-line turnkey stand alone system running on minicomputers as well as mainframes. The BLCMP circulation control system known as CIRCO was introduced in 1982 and does all the circulation control routines of charging and discharging, keeping user profiles, reservations, recalls, renewals, overdues, statistics and management information, etc.

## 3. Acquisitions and Book Ordering

The Acquisitions and Book Ordering on-line system was introduced in 1984. It provides the following routines: order creation, editing, printing, amending, receipting, accounting and other management information. In addition, it also has provision for direct electronic book ordering facilities linked through telecommunications lines to book vendors such as Blackwells.

### 1.7.2.3 OCLC

The OCLC (On-line Computer Library Centre)<sup>38</sup> originally known as the Ohio College Library was set up in Ohio (U.S.A.) in 1967 with the objectives of:

"... sharing resources and reducing the rate of the rise of costs in 50 academic libraries..."<sup>39</sup>

It is the largest library co-operative in the world with a worldwide membership of over 3000 institutions. Its shared cataloguing system became operational in 1971 when on-line access (through terminals located at member libraries) to its MARC database was introduced. In 1981, OCLC expanded their operations to Europe with the establishment of OCLC's European Office, located in the U.K.. The European Office is linked to the OCLC data base in Ohio via telecommunication lines.

OCLC has a database of over 10 million records made up of its Union Catalogue contributed by participating members, LC and UK MARC records, BIP and BBIP. The database is growing at a weekly rate of

24,000 records. And materials held in the OCLC database are in various languages including English, Spanish, Portuguese and French.

OCLC's products and services includes the following:

1. Cataloguing

Fully on-line cataloguing with functions similar to those listed under BLCMP above;

2. On-line Acquisitions and Book Ordering System with functions similar to BLCMP above;

3. Inter-Library Loan System (On-line)

It provides for On-line document searching and requests to pre-defined lending libraries are transmitted on-line.

4. Serials Control System (On-line)

Handles check-in, claiming and union listing of serial publications. With access to both local library holdings as well as to the OCLC's serials data base.

OCLC also markets an integrated turnkey stand-alone system running on both minicomputers and microcomputers - the LS/2000 system. This system also includes a circulation control module providing all the usual circulation control functions noted under BLCMP above. Circulation control is not offered in shared mode by OCLC.

1.7.2.4 SWALCAP Library Services Ltd.

SWALCAP Library Services Ltd., formerly the South-Western Academic Libraries Co-operative Automation Project, is a British non-profit library co-operative which became a limited private company in January 1986. It is controlled by member libraries who hold shares in the company. It was established in 1969 with funding from the BLR&DD. Its basic aim has been to:

"... provide integrated computer services for library housekeeping purposes and to keep these services... in line with technological developments..."<sup>40</sup>

Since 1979 it has been a self supporting body with over 20 members most of which are academic libraries. It provides both hardware and software services through its centralised computer facilities located at Bristol University. At the local level services are distributed to user institutions through minicomputers and terminals located in local service areas. The figure on the next page illustrates the basic structure of the SWALCAP centralised facilities and links to members at local centres.

SWALCAP provides a number of shared centralised services and products to its members. And they include the following:<sup>41</sup>

1. On-line Cataloguing

This service provides the same function as those under BLCMP above. The on-line cataloguing service came into operation in 1978.

2. On-line Circulation Control

This provides the same on-line circulation control functions as under BLCMP above, including short loan collection management. On-line circulation control services was first introduced by SWALCAP in 1978. An updated version was introduced in 1982. The new version to be released in 1986 will also be featured on SWALCAP's integrated stand-alone turnkey system and;

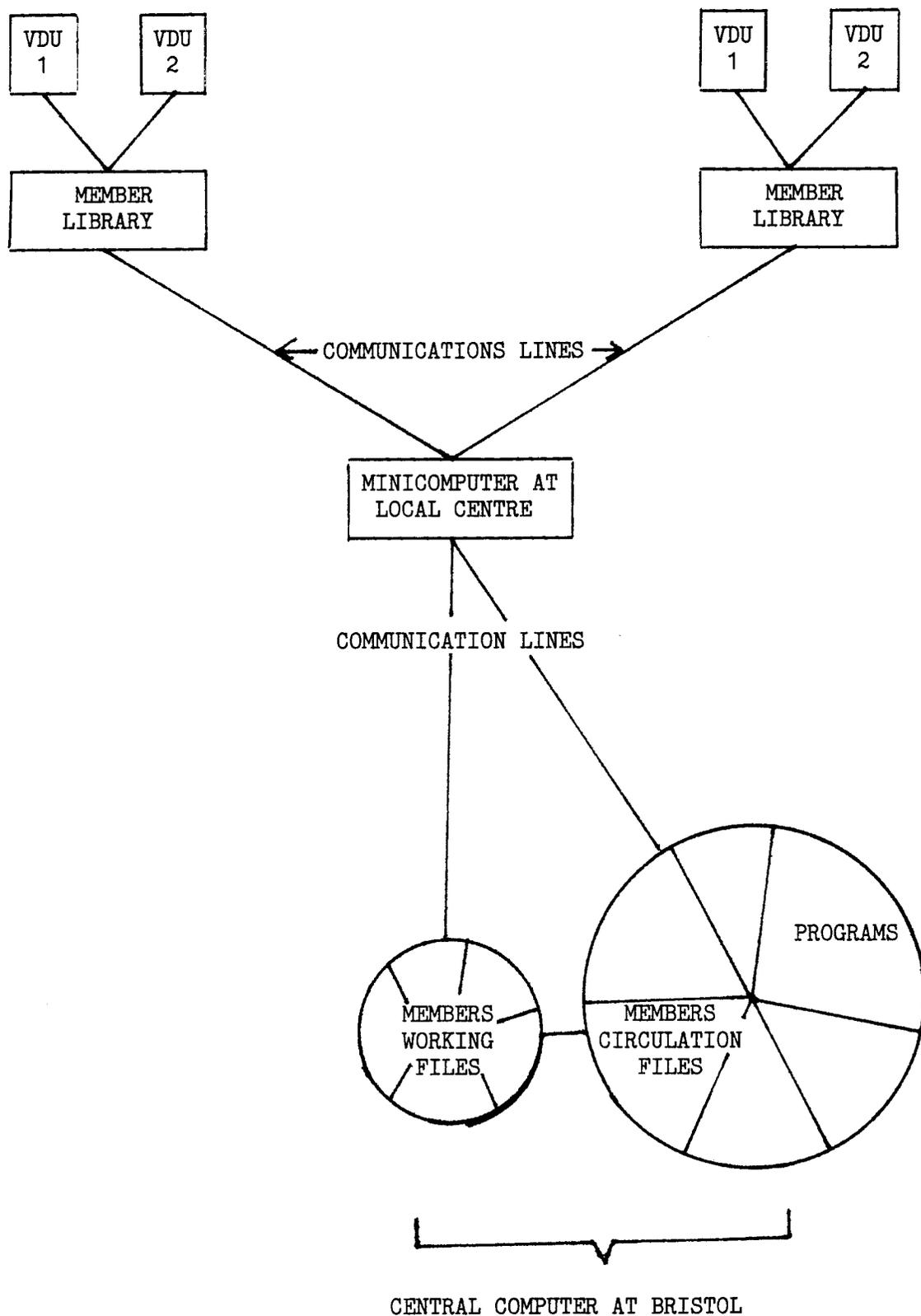
3. On-line Acquisitions and Book Ordering

As of 1985 this module was still under development.

From the foregoing discussion it is evident that although co-operatives have lost their original appeal, they still have some uses to libraries. There are certain library operations such as cataloguing, ILL, and acquisitions and book ordering which can be done more efficiently through a co-operative. Others, such as circulation control and public information systems, are better done locally.

Figure 4

SWALCAP Structural Links with Member Libraries



SOURCE: M.A. Lowe. Lecture material on "Library Co-operatives"  
Delivered at College of Librarianship Wales on 10/3/86.

## 1.8 Summary

As the discussions in the preceding sections have shown, the trends in library automation will continue towards decentralised systems with turnkey systems predominating because of the relative cheap prices of these systems. Library co-operatives will probably not disappear from the library scene as they are already transforming themselves into vendors of library turnkey systems.

De Gennaro sees future developments as consisting of three major trends:<sup>42</sup>

1. that library automation will continue towards local distributed turnkey systems, as part of the continuing trend in information processing of changing from the old (paper-based) to the new (electronic-based) systems;
2. that utilities will continue to maintain large centralised databases which will be used for shared cataloguing and inter-library loans. And that they will become increasingly involved in supplying numeric and textual data in electronic form to libraries, and;
3. that libraries will increasingly participate in local distributed (as opposed to hierarchical centralised networks) databases linked to each other through communications networks.

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**CHAPTER TWO**  
**FUNCTIONS OF CIRCULATION CONTROL SYSTEMS**

**2.1 Introduction**

The development of library circulation control systems can be characterised as having gone through three basic historical phases which for our purposes we shall term: manual non-mechanical; manual-mechanical; and computerised. Although we are in the midst of the third phase (computerised), aspects of the first two still exist in many libraries either as the main mode of circulation control or as supplements to the computerised systems. In this chapter we discuss the functions of circulation control. And the purpose of this chapter is two fold:

- (a) to define the role and purpose of circulation control in libraries, and;
- (b) to develop a model of circulation control system upon which the various manual and computerised circulation control systems will be compared - to help us determine whether or not a given circulation control system satisfies the minimum requirements as defined by the circulation control model.

**2.2 Functions of Circulation Control**

**2.2.1 Circulation Control: Function and Purpose**

The raison d'etre of circulation control in libraries can be said to be two pronged: providing access for library users to library resources for both internal and external usage and; protection of library resources from theft, damage (of any type or form), as well as from unauthorised usage. And a reduction of these two broad

functions of circulation control lead us to the two terms of "service" and "conservation", respectively. Indeed, the two (and sometimes opposing) views on circulation control are deeply rooted in these two functions of circulation control. Whereas the "older" view of circulation was concerned mainly with conservation of library materials, the "modern" view, while not negating the conservation aspect, emphasises facilitating user access to library resources.<sup>1,2</sup>

In a way circulation control units in libraries could be said to be playing the role of bridges linking users and library resources. Freedman lends support to this view when he writes:

"Circulation service involve that function which is ultimately of the most fundamental: the satisfactory bringing together of the library user and the materials sought by that person".<sup>3</sup>

The role played by circulation control units in libraries is so crucial that it has even been suggested that libraries could be defined in terms of circulation. Atkinson highlights this point when he says:

"The circulation function of the library is so fundamental to the library activity that one could define libraries in terms of circulation: for example, an institution that owns one book and allows people to use it is a library, and an institution that may have a million books and does not allow anyone to use them may simply be a museum".<sup>4</sup>

Indeed, to the ordinary library user, the circulation desk, is in as far as they are concerned, the library, as Oram states:

"From the viewpoint of the user, a public service desk is the library. It may be a central circulation desk, a reference desk, or sometimes a desk in a specialized reading room. But generally a reader must use the circulation department if he is to borrow materials. The unseen though necessary functions of technical processing (ordering, cataloguing ...) may not be noticed or immediately appreciated if the reader cannot check out materials with a minimum effort on his part and a maximum of cooperation from the library ..."<sup>5</sup>

The strategic location of circulation control points in libraries in areas which are most prominent to the public view is not coincidental, but a deliberate one in recognition of the central role of circulation control in library service. Analogous to this is the location of the cash point in a supermarket.

Underwood sees the major function of circulation control as assisting:

"... in the satisfaction of the general objective of allowing the reader to use (usually away from the library) the documents which have been purchased by the ... library ..."<sup>6</sup>

The 1967 Library Technology Program report on circulation control systems makes a distinction between circulation and circulation control when it states:

"The purpose of circulation is to allow borrowers access to books over an extended period. Two of the purposes of circulation control are to regulate circulation of materials in such a way that the borrower can be held responsible for getting the borrowed materials back into the library (conservation), and to make library materials available to qualified borrowers requesting them under as favourable conditions as are possible".<sup>7</sup>

Lilech is supportive of this view. He sees circulation control as having two major objectives:<sup>8</sup>

- (i) the optimization of access to library materials, and;
- (ii) the controlling of the circulation of library materials among library readers as a way of ensuring that every reader's needs are satisfied as much as possible.

Because circulation control departments are the focal point of contact between libraries and users, they, by default, play the function of public relations departments of the library. And the effectiveness (and indeed the reputation) of a library service is to

a great extent judged (by users) by how the users are served at the circulation desk, as Oram succinctly summarises the point:

"... No matter what kind of library it is or what kind of training the members of staff have, one of the major concerns of the circulation departments is public relations".<sup>9</sup>

In summary, this section has looked at the function and purpose of circulation control in libraries, which we have seen as being primarily concerned with the regulation of the use of library resources.

### 2.2.2 Process of Circulation Control

Having defined the function and purpose of circulation control in libraries, we shall now examine what constitutes the process of circulation control.

According to Oram, circulation departments are made up of three basic sections: the circulation desk or point of charging out books, the bookstacks where the books are housed and records section.<sup>10</sup> Although stack maintenance is very crucial in the circulation process, we are only concerned with the charging/discharging, and the record keeping aspects of circulation in this section.

Essentially, the circulation control process, whatever circulation control system is in use, involves the collection of information on details of items being borrowed from the library; and information on details of the person borrowing the items from the library and; the length of the loan period. The products of this process is a record containing details of the loan transaction. Pak Suet Tso's summary of the elements of a circulation control system is pertinent to our discussion here:

"The primary purpose of charging systems is to record, regulate and control the movement of library stock from locations indicated by the library catalogue. Measures of regulation and control aim at ensuring the availability of stock and equal opportunity to all borrowers. Recording of the stock movement is contained in the loan file. The loan file has to satisfy a few basic requirements. One is the provision of locational information for items absent from their designated locations. Another is the provision of a procedure and control served to regulate their absence or return ...

And to this he adds a third requirement which a circulation control system should satisfy:

"... in addition, the charging system should also be able to provide systematic 'management information' which is instrumental to the efficient running of the library as a whole ..."

In the process of carrying out their dual roles of providing a service to the users and protecting library materials, librarians have, over the years, developed various circulation control systems to help them carry out these functions more effectively.

An examination of any circulation control system will reveal that they are made up of three basic components:

1. Circulation policies;
2. A mode of charging/discharging library materials which for our purposes we shall term a 'circulation control system', and;
3. People.

Circulation policies define, among other things:

- the role of circulation control units in the services the library is providing to users;
- the user population;
- services provided by the library through the circulation control units;
- the times during which the services are provided;
- the code of behaviour expected from the users and penalties for infringements on the same and;

- other rules and regulations the library deems necessary in the proper provision of services to the users.

The 'circulation control system' as defined above, is the mode of operation used in charging/discharging process, including record keeping. This may be a manual-based system, or it may be computer-based.

And the human component is there to interpret the circulation policy, administer the operations of circulation control, and to perform other activities pertinent to circulation services. Perhaps to this component should be added the user training aspects as they relate to the circulation of library materials.

An understanding of both the human and policy aspects of circulation control are important for a better appreciation of the circulation control process. Important as these aspects are, they are however, not within the domain of our study. As pointed out elsewhere in the chapter, the theme of our discussion is on circulation control systems.

### 2.3 Model of an Ideal Circulation Control System

For a circulation control system to be effective, it must meet certain minimum standards. In order to be able to determine the minimum criteria for a circulation control system, we need to know the basic elements of a circulation record upon which circulation control is based. According to Freedman, there are three types of information upon which circulation control record keeping is based.

And they include information:

1. for the collection of materials - books, serials, microforms etc. comprising the library collection;
2. for the readers or users of the library service, and;

3. for the wedding or concatenation of the first two, i.e. details of readers and the library items being borrowed.

And that a set of procedures or record keeping with respect to the third category (above) constitutes a minimal circulation model.<sup>12</sup> A complete system would then be one that provides for all three categories.

An ideal circulation control system should be able to provide for both the minimum requirements as well as many other desirable types of information crucial for running an effective circulation control system. Buckland and Gallivan<sup>13</sup> and Underwood<sup>14</sup> provide good lists of desirable features for a good circulation control model. For our circulation control model, upon which the various circulation control systems discussed in chapters three and four will be compared for effectiveness, we adapt the model proposed by Boss which appears in the Library Technology Reports (January-February 1979). The model is hereby reproduced in full:<sup>15</sup>

### 2.3.1 An Idealised Circulation Control System

An ideal system should be able to perform the following functions:

1. Permit the library staff to quickly determine that a patron is eligible for service, what his or her privileges are, and at what address he or she can be reached;
2. Permit the library's patrons and staff to quickly determine what titles are in the library's collection and where they are located;
3. Enable the staff to quickly and efficiently charge and discharge library materials, and to keep accurate and current records of these transactions;
4. Permit the library patrons or staff to quickly determine what is currently in circulation and when it is or was due back;

5. Produce overdue and recall notices, and permit the library staff to quickly determine what notices have been sent to patrons with materials charged out and what action is next to be taken;
6. Place holds on items, and permit library staff to quickly determine what titles are being held for patrons, whom they are being held and after what date the materials are no longer wanted;
7. Provide management information on the utilization of the collection to aid in staff scheduling, collection weeding and storage, and acquisitions, and;
8. Accommodate dramatic increases in collection size, number of users, number of transactions, or number of [circulation] locations without major system redesign.

#### 2.4 Types of Circulation Control Systems

As pointed out elsewhere in the preceding sections, there are basically two types of circulation control systems:

1. Manual-based systems, and;
2. Computer-based systems.

And within each of these broad categories, there are many different types, each of which is characterised by:

"... speed of operation, capital investment required, amount of labour needed, controls, and other outputs provided ..."<sup>16</sup>

These two systems are discussed in richer detail in chapters three and four, respectively.

#### 2.5 Summary

In this chapter we have defined the function and purpose of circulation control as being two pronged: to facilitate reader access to library materials and; to protect library materials against theft or damage. And that the various circulation control systems are geared towards facilitating these twin functions of circulation control.

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## CHAPTER THREE

### MANUAL-BASED CIRCULATION CONTROL SYSTEMS

#### 3.1 Introduction

Underwood defines a manual-based system as:

"... a system which depends upon the continued activities of a human operator for recording, filing and retrieving the data stored by the circulation control system..."

Perhaps the key characteristic feature of all manual-based systems, as Underwood has correctly observed above, is that in all these systems, data manipulation is done by a human intermediary. The system itself does nothing with the data other than help in either creating or storing it. Without human intervention, data stored under any of these systems is static. It needs a human operator to manipulate it into other products or formats. For instance, if we wanted to know the volume of circulations for a particular day, month, year, etc., we would have to physically count the transaction records for that particular period. It is for this reason that such varied systems as the ledger, transaction card, photographic, token, etc. are grouped under one general heading of 'manual systems'.

Although manual systems have the common characteristic of being incapable of manipulating data without human intervention, they are, however, different in terms of both their mode/speed of operation and technological make up. Within the manual systems there are two broad

categories, which we shall call:

1. manual non-mechanical, and;
2. manual-mechanical.

The manual non-mechanical systems refer to those systems in which, normally, no mechanical devices are used (other than the 'date due' stamp and ink pad) during the actual charging of library items. And the manual-mechanical systems are those that use mechanical devices in one form or another during the charging process.

Further categorisations of manual systems can be made within these two broad types: whether a system is transaction card-based; book card-based; involves user participation in the charging process (e.g. filling in transaction forms), etc. But for our purposes, we shall only be concerned with the two broad types outlined above. And for the purposes of this study we shall examine seven manual based systems: three from the manual non-mechanical, and the other four from the manual-mechanical group. For a comprehensive review of manual circulation control systems, the 1961 study report by George Fry and Associates,<sup>2</sup> is probably the most complete, with detailed descriptions of 28 systems in use in public, academic, and special libraries, mostly in the U.S. at the time of the study.

### 3.2 Manual Non-Mechanical Systems

For the manual non-mechanical systems we shall examine the following:

1. Ledger systems;
2. Browne system, and;
3. Token systems.

### 3.2.1 Ledger Systems

In the ledger system, the charging of materials essentially involves entering details of items being borrowed (author/title, etc.), and the borrower's identification in a circulations ledger. Upon the return of materials, the discharging process is accomplished by the circulation assistant initialing (in the ledger) against the entries of the returned items, thereby signifying a discharge. The more developed ledger systems have a couple of pages reserved (in the ledger) for each borrower. And each borrower is identified by either a borrower number or name. Each borrower's charges are entered on their designated pages, similar to how a club member 'signs in' his guests into a restricted club.

Most libraries no longer use this system for the circulation of long-term loan materials. But it is still very much in use for the circulation of materials in restricted access areas such as special collections, closed access periodical collections, reference collections, short loan collections, etc.

#### Advantages of the ledger system

The ledger systems have the following advantages:

1. Simple to use. They are unsophisticated and therefore easy to use by library assistants;
2. Economical. They need very little capital outlay for equipment;
3. Security. Provides security to materials by identifying borrowed materials and the borrowers;
4. Collection use data. The system provides information on collection use as well as information on reader habits and can therefore provide a good source of information for building up reader profiles for SDI purposes;
5. Easy to control overborrowing. Since all the readers charges are kept together it is easy to identify overborrowing.

### Disadvantages of the system

The disadvantages of ledger systems are as follows:

1. Overdues are difficult to locate;
2. Reservations are difficult to administer because to locate materials on loan entails going through all the pages of the ledgers;
3. Discharges are difficult to administer if the identity of the borrower returning library materials is not known;
4. If used for the circulation of normal loan materials, the system does not provide information on what library items are in circulation without a lot of investment on manpower and time;
5. The system is difficult to expand. Addition of more ledgers would increase the problems cited in 1-4 above.

### Comparison with the Model

The system does satisfy the minimum requirement of 'marrying' details of items being borrowed and those of the borrower. Variations of the system provide some management information (albeit at a cost in manpower and time) on the use of the collection as well as on user reading habits. Other than these positive points, the system falls short of the requirements of the model: it does not provide information on current status of library materials, overdues, overborrowing, and reservations are difficult to trap.

#### 3.2.2 The Browne System

The Browne system, named after its initiator N.E. Browne (1895),<sup>3,4</sup> is a card-based system. Basically, the system involves issuing borrowers' pockets to approved users. The pockets contain user details such as name and address, and other identification codes such as borrower number, reader status, department of affiliation, etc. The number of pockets issued to each user also determines the maximum number of titles (volumes of items) each user may borrow at any given

time (i.e., each pocket can only be used for borrowing not more than one copy of a library item). The other segment of the system is concerned with the identification of loanable library materials. This consists of a book/item pocket (usually stuck inside of the front or back cover of the book), and a book/item card. Both the book pocket and card contain the same details of the book, usually, author, title, accession number, date of publication and classmark. When the book is not in circulation, the book card always remains inserted in the book pocket.

The charging process in the Browne system involves 'marrying' the user borrower's pocket with the book card, by removing the book card from the book pocket (of the book being checked out) and inserting it into the user's borrower pocket. The 'marriage' between the book card and user pocket constitutes the loan record. The book being borrowed is then stamped on the date slip in the book with a 'due date' for the return of the borrowed item. The loan record is then filed in the loans file, usually arranged by 'due dates' and then by classmark or accession number or author of the borrowed item, depending on the system in use.

Upon the return of the library item, the discharge process is accomplished by locating the loan record in the loans file using the 'due date' indicated on the returned item, the borrower pocket is returned to the user and the book card is inserted back into the book pocket. The 'due date' in the book is cancelled and the book is reshelved.

Overdues are checked when the book is being discharged. For items which are found to be overdue, the appropriate overdue fine is calculated and the user's borrower pockets are detained until the

appropriate fine has been paid. Alternatively, overdues are determined by checking the loans files under 'due dates' whose materials have not yet been returned. Overdue notices are sent to the offending borrowers using the information on the 'loan record' and the user registration cards.

Reservations are processed by, first, the borrower making the reservation by filling in details of the item(s) being reserved and details of the person making the reservation (name and address) in the reservations slip. The library assistant then searches through the loans file and when the record of the reserved item is found, it is 'flagged' by inserting the reservation slip in the pocket containing the reserved title. Upon the return of the book the reserved book is put aside. And a note is sent to the person who reserved the book informing them that the reserved item is ready for collection. Readers are normally given a grace period within which they are expected to go to the library and charge out the reserved items or else the items are returned to the shelves or given to the next person on the reservations list.

Recalls are processed in the same way as in reservations, only that when the record of the recalled item is found, the person holding the recalled item is sent a note requesting them to return the recalled within a specified period.

And renewals are handled by recharging the item after the loan record of the item has been retrieved from the loans file, and restamping the item with a new 'due date' and refiling the loan record in the new 'due date' in the loans file.

### Advantages of the Browne System

The Browne system has the following advantages:

1. Economical. The system requires very little capital outlay for equipment;
2. Simple to use. It is easy to train library assistants how to use the system;
3. Overdues are easily identified by checking the 'due date' stamped in the book upon the books' return and also by checking the loans files for outstanding loans;
4. Fast charging. Charging of materials is very fast thereby preventing queues of patrons forming at the issue desk,
5. Overborrowing is controlled. Theoretically it is easy to control overborrowing since each user is given a fixed number of pockets which also determines their borrowing limits;
6. The system provides for the collection of statistics on the use of the collection.

### Disadvantages of the Browne System

The Browne system has the following disadvantages:

1. Labour intensive system. The system involves a lot of filing and unfileing and therefore requires a lot of labour input;
2. It is difficult to locate reserved items when their due date is not known. Under such circumstances the only option left is to search through the whole loans file. This can be both time consuming and expensive;
3. Slow discharge. The discharge process is time consuming resulting in long queues forming at the issue desk during peak periods. And the process takes even longer if the records are misfiled. Misfiling is a common feature of the system;
4. Recalls, renewals and reservations are difficult to effect as library assistants have first to laboriously locate the loan records;
6. Unifile system. The system allows the maintenance of only one loans file. Unifile systems are not suitable for certain types of libraries such as academic libraries which need to access the files by various avenues such as subject, author, etc.

### Comparison with the Model

The Browne system meets the minimum requirements for a circulation control system - the 'marrying' of details of the borrower and the borrowed item. The system also provides some statistics on the use of the collection, although at a cost in labour and time. But even with these advantages, the Browne system still falls short of the requirements of the model: it cannot provide information to the fundamental requirement of a circulation control system, i.e., determining the current status of library materials and; it has a cumbersome method of handling reservations, statistics, discharges, renewals, etc.

### 3.2.3 The Token Systems

There are two variant types of the token system: reader token, and; the library token.<sup>5</sup> The major difference between these two types is that in the reader token system the reader takes the unused tokens out of the library, while in the library token system the reader surrenders all the unused tokens to the library. In other words, under the library token system tokens are issued to patrons when they come into the library and they can be used for borrowing books, and those which are not used are surrendered to the library before the patron leaves the library. For our purposes, the discussion will be based on the reader token for two reasons: the basic operations of the two systems are similar and the reader token system is the more widely used of the two types. Underwood describes the essential fetures of a reader token system developed by Westminster City Libraries as follows:

"... On registration, each reader is given an identity card and a number of tokens, each of which is exchangeable for a document. On each occasion that a document is borrowed, the identity card must be shown and a token given up; the date due for return is stamped on

the date label of the document. Each identity is valid for one year; on expiry of the card, the reader must show a number of tokens or documents equivalent to the numbers of tokens with which he was first issued. If any are missing, a substantial charge is made for their replacement...<sup>6</sup>

Upon the return of library items, tokens are returned to the user. Overdues are trapped upon the return of items by checking the due date stamped in the book, overdue fines are calculated, and upon payment of the relevant overdue fines the tokens are returned to the patron.

The tokens do not contain any information on borrower details other than the proprietary name of the library issuing them. Other systems similar to the token are the 'honour' systems where no records on materials lent out are kept and readers are expected to return to the library items loaned to them on their own 'honour'. Token systems, until the advent of computers, were very popular in public libraries.

#### Advantages of the Token Systems

The token system has the following advantages:

1. Fast charging/discharging. The system does not involve creation or destroying of records when charging and discharging respectively.
2. Because of 1 above, the library does not have to keep many circulation files on users and materials in circulation;
3. Savings in labour due to less record creation activities at the issue desk and;
4. Economical. Other than the cost of printing the tokens, the system is relatively cheap to maintain.

### Disadvantages of the Token Systems

The token systems have the following weaknesses:

1. The library, under this system, loses control over the circulation of library materials because the system does not provide for the tracking of the current status of library materials;
2. Reservations and recalls are difficult to make under this system;
3. Delinquent users are difficult to trap;
4. Statistical and other management information on the use of the library collection are virtually impossible to collect.

### Comparison with the Model

The system fails to satisfy even the minimum requirement of keeping details of borrower and borrowed materials. Although it has the advantages of speed and economy, the system violates the very essence of circulation control, i.e., knowing the current status of library materials at any given time. For these reasons the system is ineffective as a tool for circulation control as defined.

### 3.3 Manual-mechanical Systems

The introduction of mechanical systems in libraries was necessiated by pressures exerted on libraries by increasingly complex and literate societies which libraries had to serve as a consequence of the industrial revolution and the introduction of mass education in Europe and North America. With these increased pressures for both public and academic library services, library circulation policies changed from being essentially conservationist to service oriented. And as libraries redefined their new roles in the new industrial and literate societies, circulation control systems such as the 'ledger' became increasingly inadequate. And in their quest to provide a service that was advantageous to both the library and the user in

terms of speed and efficiency in charging and discharging library materials, librarians turned to technology for help. The introduction of mechanical devices in library circulation control began at the turn of the century with the introduction of the Newark System in 1900.<sup>7</sup> The crucial innovation of mechanical systems over their non-mechanical brethren was that the creation of the circulation record during the charging process was accomplished with the aid of a mechanical device. And mechanical systems such as the Newark System eliminated some of the repetitive routines in circulation control such as filling out numerous forms during the charging process.

The purpose of this section is to examine the strengths and weaknesses of some of the mechanical circulation control systems. In this section we look at the following four systems:

1. Newark System;
2. The McBee Keysort System;
3. The IBM charge card and;
4. Photographic systems.

### 3.3.1 The Newark System

The Newark system was developed by the Newark Public Library of New Jersey (U.S.A.) around 1900. It has both manual and semi-automated versions. Boss and McQueen describe the essential features of a Newark-based system as follows:

"In the Newark-based circulation control system, a borrower's number and the due date are imprinted on the book card from an embossed borrowers card, and standard due dates are recorded in the machine. Book cards are filed in author or call-number order under the due dates. When the books are returned, the library staff uses the due date in the book to pull the book card from the date file. Book cards that remain in the file after due date are easily identified. Overdue notices can be written or typed, after the borrowers have been identified, by

consulting a patron registration file maintained by patron number."<sup>8</sup>

Variations of the Newark system include systems developed and marketed by commercial companies like the Gaylord Bros., manufacturers of the Gaylord C (which is very similar to the system described above) and the electrified and semi-automated Gaylord 400 (which eliminated the need to look up the borrowers details from the borrowers registration file by having the name, address and number embossed on the borrower's plastic card); and the Demco Corporation's Demco charging machine.<sup>9</sup>

The Newark system is used by many types of libraries including public, academic and special libraries.

#### Advantages of the Newark System

A Newark-based system has the following advantages:

1. Provides control to the library as to who is holding what library items;
2. Overdues are easy to locate;
3. Location of reserved materials is easy if the records are not misfiled;
4. The system is simple to operate and therefore easy for library assistants to learn;
5. Economical in terms of equipment and other running costs (other than personnel);
6. Provides for the collection of statistics on the usage of the collection.

#### Disadvantages of the Newark System

And the Newark System has the following disadvantages:

1. The system is labour intensive because it involves a lot of filing and retrieving of loan records and is therefore costly;

2. A misfiled record may involve searching the whole file and may lead to delays in discharging, reserving, renewing or recalling library items;
3. It is not easy to trap reserved materials;
4. It is difficult to trap delinquent users especially during peak periods as assistants have to consult the manual list of delinquent users;
5. The library cannot tell the current status of library materials without going through the whole loan file manually;
6. The collection of statistics and other management information involves a lot of extra effort in personnel and time.

#### Comparison with the Model

The system does satisfy the minimum requirement of a circulation control system. It also provides other information such as due dates for the return of the borrowed items, and statistics on collection usage. Although the Newark System facilitates the charging/discharging process, and the identification of overdue materials, it, however, still falls short of the requirements of the ideal system. As noted in the disadvantages of the system, collection of other types of information such as statistics requires extra investments in time and labour, and the system cannot provide instant information on the current status of library materials.

#### 3.3.2 The McBee Keysort System

In order to cut down on circulation turn around time, labour, and to collect more circulation information automated systems, beginning with edge-notched cards and later the punched card using the IBM 80-column cards, were introduced. These were the forerunners to the data collection devices which introduced the first usage of computers in libraries in the 1950s. The McBee key-sort system is one of the

most famous edge-notched card systems. Freedman describes the system as follows:

"The McBee key-sort system involves the use of cards with pre-punched holes around the edges, one of which can be notched to indicate the date an item is due [and/or patron status]. The cards are arranged by call number creating a single sequence. The insertion of a needle-like device through a hole will allow all the books overdue for a given date to fall free of the desk... Each card has (written by the borrower) the borrower's name and address and the call number, author and title of the book. Thus the library is saved the labour of creating circulation cards and maintaining registration for every patron - all of the information needed is on the card...<sup>10</sup>

These systems were mostly used in special libraries serving business and industry.<sup>11</sup>

#### Advantages of the McBee Keysort System

The system has the following advantages:

1. The burden of record creation is on the library patron, therefore reducing the need for more library staff at the circulation desk;
2. Since all the circulation information is on the transaction card, the library does not need to maintain patron registration files;
3. Overdues are easily identified in this system.

#### Disadvantages of the System

The McBee Keysort system has the following disadvantages:

1. The library loses control over the record creation process. Because patrons fill out the transaction cards, illegible cards may result in collection of invalid records;
2. The charging process is necessarily slow because the patron has to fill out the cards. Fast charging is very important especially in busy libraries where queues may easily form at issue desks;
3. Trapping of delinquent borrowers under this system would require the creation of a separate file, and;
4. The system does not provide for the collection of statistics or collection usage.

### Comparison with the Model

The system meets the minimum requirements of keeping details of borrower and the borrowed materials and the date they are due for return. Besides this, the system fails to meet the requirements of the model for the following reasons: charging of materials is slow; the system does not provide for the collection of management information on the use of the collection and, crucially; it does not provide information on the current status of library materials.

#### 3.3.3 The IBM Charge Card

The IBM charge card system is punched card-based. The George Fry Associates describe its essential features as follows:

"In this system, the borrower fills out an IBM charge card with complete borrower and book information. The card is punched for due date and filed by hand in the circulation file. When the book is returned, it is manually matched with the card in the file and the record is destroyed. Periodically the entire circulation file is sorted by IBM equipment for overdue cards. After the overdue notices are prepared, the cards are manually refiled in the circulation file..."<sup>12</sup>

Variations of these punched card-based systems include the Marginal Punched charge card which uses marginal punched cards rather than internally punched IBM cards and the circulation file is sorted by hand using a needle instead of a sorting machine; the IBM Montclair; IBM Brooklyn College; and the IBM Unit Card-Decatur, all of which are described in the George Fry Associates publication cited elsewhere in the chapter.

These punched card-based systems were used mostly by academic libraries chiefly in the U.S.

### Advantages of the Punched Card Systems

The major advantage of punched card systems was the speed with which the circulation cards were sorted by machine. Further, the systems provided more detailed statistics. Since such tasks as sorting were performed by machines in some variations of these systems, they tended to be less labour intensive. And the systems were capable of coping with large quantities of loans without much difficulty.<sup>13,14</sup>

### The Disadvantages of Punched Card Systems

The chief disadvantages of punched card systems were the initial high costs for punch and sorting equipment and the IBM cards. These systems also required well trained staff to operate the punch and sorting machines. And the reservation process involved the creation of a separate file, thereby making it difficult to trap reserved items.

### Comparison with the Model

The systems satisfy the requirement of marrying details of the borrower and the items being borrowed. And significantly, these systems provides for the collection of detailed statistics on collection use. But they fail to meet other requirements of the ideal system of the model: knowing the status of library items requires extra effort of having to manually search through the whole circulations file; overdue notice production and reservations processing require extra effort.

#### **3.3.4 Photographic Systems**

The charging process in the photographic systems essentially involves taking microphotos of the library patron's user card (which has details of name and address), the book identification card (as in the Newark System), and a sequentially arranged date-due or date of issue

slip together in one image. A microfilm reel of these loan records constitute the circulation file. The date of issue slip (or date-due) is put into the book being charged out. And the discharge involves crossing off the date of issue (or date-due) slip using the number on the date due slip. Overdues are identified by checking the sequence of numbers not crossed for that particular due date from the numerically sequenced microfilm.<sup>15</sup>

One of the most popular photocharging systems is the Eastman Kodak Company's Recordak Starfile Microfilmer RV1. Other variations of the photographic systems include the Bro-dart marketed system which thermo-graphically produces eye-readable records instead of micro-images.<sup>16,17</sup>

#### Advantages of Photographic Systems

The major advantage of photographic systems is the speed with which the charging process is accomplished. They are, therefore, very handy in libraries with very high volumes of circulation activity. This perhaps explains why these systems were very popular with public libraries. Further, because all the circulation records are held on microfilm, the keeping of borrower files becomes unnecessary, thereby resulting in savings in staff at the issue desk.

#### Disadvantages of the Photographic Systems

The major disadvantages of photographic systems is the inability to consult the microfilm file,<sup>18</sup> and the status of library materials cannot be determined without having to go through the whole microfilm file. Perhaps this is the major reason why, even with their extremely fast charging capabilities, academic libraries which do a lot of consulting of files, do not use these systems. Because of the inability to consult the files, delinquent borrowers and reservations

are difficult to trap, and the systems do not provide detailed statistics other than the transactions made by use of the sequenced date of issue or date due slips. And the initial capital outlay associated with these systems are usually high.

#### Comparison with the Model

The systems provide the minimum requirement of keeping details of the borrower and the borrowed materials. But other than the fast charging they afford, the systems fail to meet the other requirements of the model for the following reasons: consultation of the files is not possible without consulting the whole microfilm reels; and because of this, it is difficult to trap delinquent users and reservations, and; statistics and other management information are not readily collectable from the system.

#### 2.4 Summary on Manual Systems

In the preceding sections we have examined some of the manual-based circulation control systems. It has been shown that these systems developed historically from essentially "crude" circulation systems such as the 'ledger' to other more developed mechanical and non mechanical-based systems. And that these changes in circulation control systems evolved in tune with the changing philosophy in library service from being primarily concerned with the conservation of library materials to providing a service to the users through increased user access to library materials. It has also been shown that manual systems, to a large extent, most of them do meet the minimum requirement of keeping details of borrowers and library materials on loan. And the general weakness of all manual-based

systems was found to be their inability to:

1. provide current information on current status of library materials;
2. provide statistics and other management information with minimum effort;
3. provide traps for delinquent borrowers and reservations;
4. provide a system that is not labour intensive, and;
5. perform the requirements of a minimal circulation system plus other requirements of the ideal model.

It is for these reasons that with the advent of the digital electronic computer, libraries have increasingly been experimenting with this new tool in their search for an ideal circulation control system. We now consider computer-based circulation control systems.

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## CHAPTER FOUR

### COMPUTER-BASED CIRCULATION CONTROL SYSTEMS

#### 4.1 Introduction

In the preceding two chapters the role and purpose of circulation control in libraries was defined as essentially being concerned with the management of patron usage of the library's collection. And that in the process of carrying out this function, the circulation control process involves the creation and maintenance of loan records containing details of materials being borrowed from the library and those of the borrowers. It has also been postulated that for a system to be effective, it must be able to carry out this process with utmost speed, accuracy, and with the least effort on the part of both the library staff and the patrons.

In order to deal with the problems associated with circulation control, especially those associated with record creation and maintenance, various types of manual-based circulation control system employing various technologies, have been developed and tried over the years. But while most of these systems meet the minimum requirement of a circulation control system (i.e. marrying details of the borrower and library items being borrowed, in a loan file), at best, these systems only improve some aspects of the circulation process, such as a faster charging time, while aggravating other aspects such as discharging and retrieval of circulation records (e.g. the token and photographic systems examined in the previous

chapter). In general, manual systems fail to meet the requirements of an ideal circulation control system because of their inherent weaknesses, some of which lie in their inability to:<sup>1,2</sup>

1. readily yield information about exceptional conditions;
2. provide for the convenient and easy collection and processing of statistical data;
3. provide for facile production of notices and reports, and;
4. permit fast manipulation of data or duplication of data.

It is for these reasons that librarians have, since the 1960s looked to the computer for help with their record creation and maintenance problems associated with the circulation control function. In this chapter we examine computer-based circulation control systems, their strengths and weaknesses for library application, with emphasis on demonstrating how they offer a better alternative to manual-based systems.

#### 4.2 Justification for Automation of Circulation Control

Studies on circulation control systems have shown that automation of the circulation process does not necessarily result in savings in costs. On the contrary, automated circulation control systems have been associated with increased costs.<sup>3,4,5,6</sup> But as the case for library automation presented in chapter one has argued, it is generally agreed that the automation of the circulation function helps the library to carry out its operations more efficiently, thereby resulting in the provision of a better service to the users. We now examine the specific reasons for the automation of circulation control.

Of all the library operations, circulation control is perhaps the most suitable candidate for automation. The reasons for this are many and include the following:

1. circulation control operations involve many routine, and repetitive tasks, and many decisions in these processes are simple, repetitive tasks are done more efficiently by the computer;
2. circulation control involves constant generation, deletion, consultation, and retrieval of records. All these tasks can be easily executed by the computer at no additional cost or effort;
3. circulation control units handle the highest volume of activity involving direct participation between the library staff and the users. The need to process the charging and discharging of library materials with dispatch cannot be any more wanting in this critical public relations area of the library. The computer is able to provide these capabilities efficiently;
4. circulation control units must be able to accommodate, without major disruptions to services, expanded library collections and increased circulations as more people come to use library facilities. Again, the computer can handle expanded circulations without requiring major modifications to the system at little extra cost, and;
5. circulation control systems need to provide statistics and other management information upon which current and past services can be evaluated with a view to improving future services. Only computer-based systems can collect and give relevant analyses of management information as part of the regular products of the system at no extra cost.

To illustrate the need for an automated circulation control system, let us consider these two comments made by two librarians describing the performance of Ohio State University Libraries' circulation system and the service it offered to its patrons before<sup>7</sup> and after<sup>8</sup> automation, respectively:

"Circulation, as with most of the library functions ... needed the ability to meet expanded enrolments, larger book collections and changes, if not expansion, and the amount of materials used by students and faculty. The existing system had broken down, students were waiting in line half an hour to get a book. There was the problem

of knowing where the materials were. The McBee key sort system, which seems to be a fairly clear one, had got more and more complex. Since Ohio State is a relatively decentralized system (there are twenty-one departmental libraries as well as the main library), it become almost impossible and psychologically impossible for a patron who discovered that the book he wanted in one library was out. He did not know how, of course, to go about finding another copy. It turns out, off course, that when a student goes once and fails, he quits. In a voluntary agency like a library, the ability to find things easily and quickly is important if ... people should use library materials".

And;

"Within seconds the patron can learn whether or not the library has a book by a particular author, where copies are located and which copies are available for circulation. He no longer has to wait to write out involved charge cards but simply gives the operator his identification number ... By sending out overdue billings and other notices on a regular basis, the patron is kept better informed of his obligation to the libraries and its other users".

It is clear from these two comments that the installation of a computer-based system solved most of the circulation control problems that had characterised the manual system it had replaced.

#### 4.3 Benefits of Automation of Circulation Control

Markuson gives five major benefits of automated circulation control as:<sup>9</sup>

1. elimination of repetitive, time consuming manual tasks;
2. improved control over files;
3. improved collection control;
4. improved statistical and management data analysis, and;
5. improved service to users.

And to these, she adds a further five specific benefits which a sophisticated system ought to provide:<sup>10</sup>

1. automatic overdue control;

2. automatic control of items on which reserve requests have been placed at the time a transaction occurs;
3. automatic overdue-time accounting;
4. improved patron control (i.e., automatic identification of users and their borrowing rights), and;
5. automatic detection of delinquent patrons at the time a transaction occurs.

Other benefits of automation of circulation control are given by the James E. Rush Associates. Although they repeat some of the benefits cited above, they however, highlight other beneficial aspects of automation that are not apparent from the above. These are:<sup>11</sup>

1. increased speed and accuracy of recording of loan transactions;
2. increased accuracy and timeliness of data representing the status of the library's collection at any moment in time;
3. improved facility for handling delinquencies;
4. better, more timely management information and;
5. decreased cost of processing in all aspects of circulation control.

#### 4.4. Goals of Automated Circulation Control

For any circulation control automation programme to succeed, it must have goals which the desired system is geared to achieve. Goal definition in library automation is important for two reasons:

1. it can be used as a basis for measuring the effectiveness of the system, and;
2. it can be used for determining system specifications.

System specifications are very crucial when making the choice of the appropriate hardware and software for the desired system. The goals set for any system will, to a large extent, depend on the type and size of the library it will serve, and how the library has defined

the role of circulation control and the services it wishes to provide. The needs of an academic library will definitely be different from those of a public, special or school library and their goals will inevitably be varied. For instance, an academic library may require a system that charges library materials on a hourly, fortnightly, and termly basis, while hourly charging may not be necessary for a public library. But an automated system should be able to perform certain functions which are basic to all types of libraries. The James E. Rush Associates provide probably the most comprehensive list of goals for an automated system. And because of their relevance to this study they are hereby reproduced in full:<sup>12</sup>

1. accurate, timely recording and maintenance of loan transaction data (including that for materials, equipment and facilities);
2. accurate, timely and thorough handling of overdues, fines and other exception conditions;
3. recording of and access to status and other information about the collection (e.g. on loan, overdue, lost, reordered);
4. reduction in staff time devoted to circulation functions;
5. increase in speed and efficiency of service to patrons;
6. reduction in workload to manage reserve collections;
7. consistent, convenient access to data about library materials, equipment and facilities (bibliographic, holdings, locations and status) by patrons and staff;
8. efficient maintenance of patron records;
9. ability of all units of a library or library system to act in a concerted fashion and to have access to a composite set of data files;
10. provision of accurate, reliable and timely statistical data for reporting, collection development, management budgeting, and so on;
11. production of circulation data displays in various arrangements and various physical formats (e.g. hard copy, microfilm, video);

12. evaluation of library materials and equipment on the basis of usage (including interlibrary loan and in-house usage);
13. analysis of use of materials, equipment and facilities by academic discipline, subject, patron class or other categories;
14. interaction with interlibrary loan and public service for improved access to holdings and location data, and for elimination of redundancy of data storage;
15. access to data in a manner permitting staff manipulation for analysis, planning, management and control;
16. facility for tracking materials as they move through various stages of processing, and;
17. ready, accurate, and reliable production of meaningful statistical and fiscal reports, either automatically or on demand.

Having looked at the positive side of computer-based circulation systems, perhaps it is appropriate to look at some of the negative aspects of these systems.

#### 4.5 Problems of Computer-based Circulation Control Systems

Compared to the manual-based systems, there is no doubt that computer-based systems offer better capabilities for circulation control. But even with these capabilities computer-based systems are not immune to problems, although these problems may not be on the same scale as those associated with manual systems.

There are four major problems associated with automated circulation control:

1. high capital investments required;
2. susceptibility to total failure;
3. problems of privacy, and;
4. problems of implementation.

#### 4.5.1 High Capital Investments Required

Automated systems require a high capital investment to initiate. And besides the capital investments required for hardware and software, further capital outlays are required for technically qualified personnel, system design, and the usual running costs. Faced with these costs, a library which, for instance, is failing to maintain its periodical subscriptions would find it almost impossible to justify its automation budget to its governing body. This problem becomes even more acute for libraries in developing countries facing critical foreign exchange problems.

#### 4.5.2 Susceptibility to Complete Failure

Perhaps the major criticism of automated circulation control systems is their susceptibility to complete failure. While a manual-based system may be slow and unreliable, a failure in an automated system could result in a major disruption to service.

#### 4.5.3 Access to Records and Privacy

An automated system can collect, automatically, details of the reading habits of users.<sup>13</sup> Access to this information stored in electronic form brings problems of privacy. For instance, how does a library handle a situation where they are compelled by the government to provide information on the reading habits of certain individuals who the state thinks pose a security risk?

#### 4.5.4 Record Conversion and Implementation

System design and acquisition of the requisite hardware and software constitute the first phase in the process of automation. The second phase, implementation, is perhaps the most difficult in the whole process. One of the most taxing areas of implementation is the conversion of circulation records into machine readable form. This

can be a long, costly and often frustrating process in which disruption to service is not uncommon.

#### 4.6 Approaches to the Automation of Circulation Control

Basically, there are four ways in which a library can automate its circulation control function:

1. in-house development;
2. bureau approach;
3. turnkey system approach, and;
4. cooperative approach.

All these approaches, including their strengths and weaknesses, are described in richer detail in chapter one. And will, therefore, not be discussed any further in this section.

#### 4.7 Modes of Operation of Computer-based Circulation Control Systems

Computer-based systems operate in two modes:

1. off-line batch mode, and;
2. on-line real-time mode.

Kimber makes a distinction between real-time and batch-operated systems when he writes:

"... the real-time system has the full power of a computer immediately available during library opening hours, whereas a batch system makes use of the computer only intermittently, so that it is only the system products that are immediately available during library opening hours. It is this instant availability of computing power that provides the important difference, as far as library services are concerned, between batch and real-time systems. And this computing power is seen in the form of a wide range of different responses the system is able to make to a variety of circulation transactions".<sup>14</sup>

And the term 'on-line' is usually used to describe a system's ability to access data stored on computer at any time. In practice the two terms 'real-time' and 'on-line' are used interchangeably.

Boss and McQueen define a real-time circulation system as:

"... one in which charges, discharges and other transactions are transmitted to and processed by the computer as they occur ..."

To begin with, we examine the batch-operated systems.

#### 4.7.1 Batch-Operated Circulation Control Systems

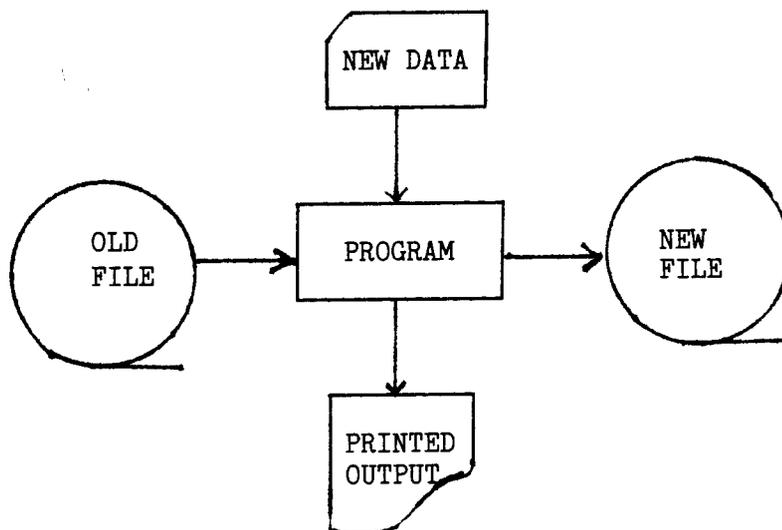
The earliest computer-based circulation control systems were batch-operated. Under these systems circulation information is collected and stored by data capture devices at circulation control terminals and processed by the computer later. The data capture devices used include keypunch machines, key-to-tape devices, intelligent terminals etc. The IBM 357 data collection unit was one of the most extensively used systems in the US.<sup>16</sup> Boss and McQueen describe a typical batch-processed circulation activity as follows:

"... specially prepared decks of cards are stored in pockets in the books. Each card lists the author, truncated title, call number, and accession number. The additional information required to charge or discharge an item - borrower identification number, date, and a transaction code - is punched into plank portions of one of the cards as each transaction takes place. Computer processing typically consists of updating the master circulation file maintained in accession-number order on magnetic tape. When all circulation transactions have been processed, one or more lists are printed. These lists provide information about items in circulation. At predetermined intervals, the master circulation file is further processed to identify overdue items, produce notices, report circulation statistics and print special lists of delinquent borrowers or lists of circulation items placed on hold ..."<sup>17</sup>

The figure below illustrates the basic file updating process in a batch-operated system:

Figure 5

Basic File Updating in Batch Mode



SOURCE: Richard T. Kimber. Automation in libraries, 2nd ed. (Oxford: Pergamon Press, 1974), p.98.

Advantages of Batch-operated Systems

Batch-operated systems have the following advantages:<sup>18,19,20</sup>

1. Economical. Perhaps the major advantage of batch-operated systems over real-time systems is that they cost much less to set up and run in terms of both hardware and software. For instance, these systems require less storage capacities and CPU processing time than these real-time brethren;
2. Simple design. The design of batch-operated systems is simple and therefore relatively easy to run;
3. Provides detailed statistics. The systems provide detailed statistics and other management information on collection use. This information can be used by the library management to improve existing services as well as for the planning of future services;
4. Accurate data. The systems provide for the collection of accurate circulation data (i.e. less errors and other mistakes in the data because these are trapped at the time of input), and;

5. Labour savings. Filing and sorting of circulation records is done automatically by the system. Because of this, these systems tend to be less labour intensive than manual systems.

#### Disadvantages of Batch-operated Systems

Disadvantages of batch-operated systems can be summarised as follows:

1. Circulation files are dated. There is usually a time lag between the occurrence of a transaction and the time the data is processed by the computer. The time lag can be anyway from a few hours, days, to a couple of weeks;
2. Lack of effective trapping controls. Batch-operated systems are weak on trapping delinquent borrowers, and recalled and reserved items. The ability of the systems to perform these trapping functions is dependent on the frequency of file updating, and;
3. Inaccessible data. Files stored in machine readable form are not directly accessible from the circulation desk. The files cannot, therefore, be consulted.

#### Comparison with the Model

Batch-operated automated circulation control systems meet the minimum requirements of a circulation control system. In addition to this they also enable a library to collect and analyse a variety of statistical and other management information. And the systems help the library to create accurate and almost error-free data. Although batch-operated systems offer many improvements over most manual-based systems, they however, still fail to meet the requirements of an ideal system as set out in the model for the following reasons: they do not provide current information on the status of library materials; trapping functions can only be effected after the event and; information is not directly accessible for searching or consultation to the circulation desk.

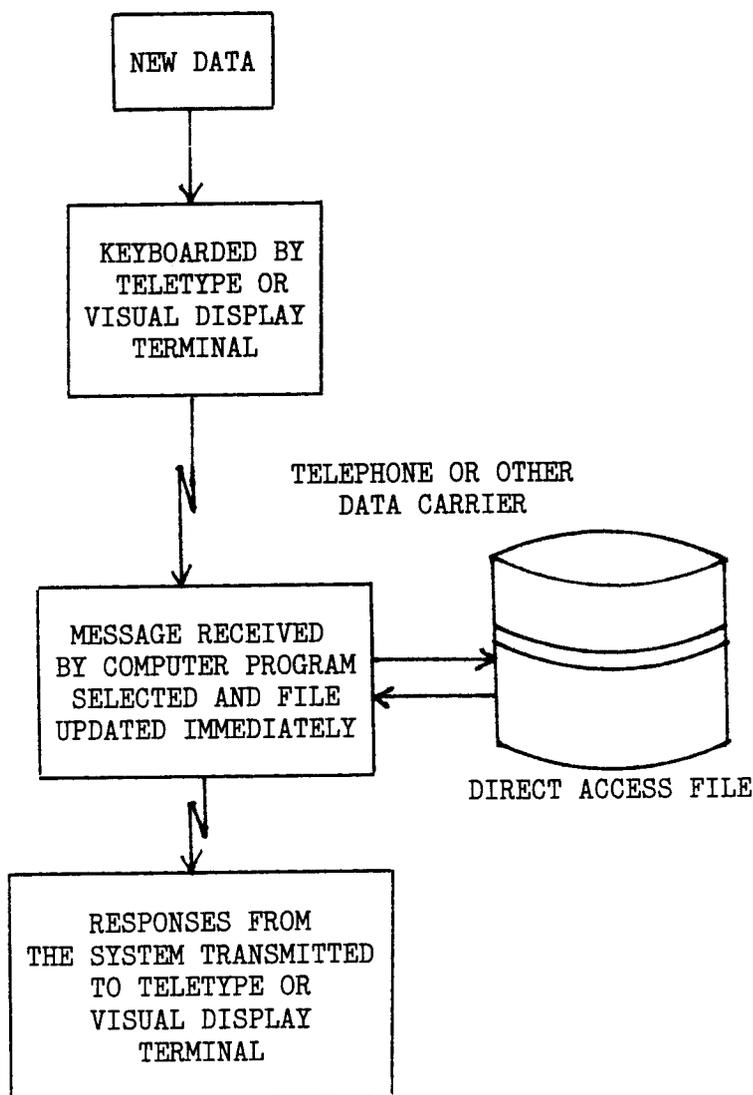
#### 4.7.2 On-line Real-time Systems

On-line real-time systems began receiving wide application in libraries in the 1970s. This followed the development of cheaper but powerful mini-computers which libraries could afford to purchase. Earlier on-line systems were developed by big research, public, and university libraries such as those developed at the university of Chicago<sup>21</sup> and the East Brunswick (New Jersey, U.S.A.) Public Library.<sup>22</sup> But general purpose systems which libraries could purchase as a package of hardware, software and maintenance, were developed by commercial companies like CLSI. As discussed in chapter one, these systems are popularly known as 'turnkey systems'. Packaged circulation control systems come either as a single application system dedicated to circulation control functions only, or it may be an integrated system with linkages to other library operations such as cataloguing, acquisitions and book ordering, etc. Reviews of some of the earlier and current vendors of turnkey systems and their products are provided by Markuson,<sup>23</sup> Boss,<sup>24</sup> Boss and McQueen,<sup>25</sup> Dranov,<sup>26</sup> and Bahr.<sup>27</sup>

As noted in the definition above, under the real-time on-line systems, disks containing circulation data are continuously accessible on disk drives. And circulation data can be retrieved from, deleted or added to these disks in real-time. Connections between the disk drives and the terminals located at circulation desks are via telecommunications lines (such as telephone lines). The figure below illustrates the basic file updating process in on-line real-time mode:

Figure 6

Basic File Updating in Online Real-time Mode



SOURCE: Richard T. Kimber, Automation in libraries, 2nd ed. p.99.

Advantages of On-line Real-time Systems

Among the benefits of on-line real-time circulation control systems are the following:<sup>28</sup>

1. increased speed and accuracy of recording of loan transactions;
2. increased accuracy and timeliness of data representing the status of the library's collection at any moment in time;
3. improved facility for handling delinquencies;

4. better, more timely management information, and;
5. decreased cost of processing in all aspects of circulation control.

And Boss and McQueen provide the following specific benefits:<sup>29</sup>

1. quick determination of titles in the library's collection and their location;
2. immediate information on what titles are currently in circulation and when they are/were due back;
3. completely current information about the notices that have been sent to patrons who have charged out materials and about what action is to be taken next;
4. quick determination of the titles being held for patrons, for whom they are held, and the date after which they are no longer required;
5. provision of management information on the utilization of the collection to aid staff in scheduling, collection weeding, storage and selection;
6. the capability to adjust to dramatic changes in circulation volume with minimal investments in new staff or equipment,<sup>30</sup> e.g. circulation points can be increased or decreased as conditions dictate at little extra cost, and;
7. the possibility of merging the circulation sub-system into the entire library records system including acquisitions, cataloguing, public access catalogues, etc.

#### Disadvantages of On-line Real-time Systems

On-line real-time systems have the following disadvantages:

1. Cost. As with all computer-based systems, on-line based systems require a very high initial capital outlay. Further, on-line systems cost much more than batch-operated systems in terms of the enormous storage capacities required, and the extensive usage of the CPU by these systems.
2. Susceptibility to complete failure. A break down in an on-line-based system could result in a major disruption to services. These systems, therefore, need a good back-up facility and maintenance service. Maintenance problems can be quite trying especially to libraries in developing countries who are away from major centres where computer manufacturers are located.

3. Problems of confidentiality of user records. As noted elsewhere in the chapter, records stored in electronic form bring problems of access and security.

#### Comparison with the Model

On-line real-time circulation control systems in principle, would seem to meet almost all the requirements of the ideal model. But even within the category of on-line systems, as the discussion in the next section will reveal, there are variations within these systems some of which make them slightly lacking in meeting the requirements of the model, such as the ability to "permit the library's patrons and staff to quickly determine what titles are in the library's collection and where they are located". Perhaps an examination of the different types of computer-based systems would help in throwing more light on this aspect.

#### 4.8 Types of Computer-based Circulation Control Systems

There are basically four types of computer-based circulation control systems:<sup>31</sup>

1. batch-operated "absence" systems;
2. batch-operated "inventory" systems;
3. on-line real-time "absence" systems, and;
4. on-line real-time "inventory" systems.

As implied from the above, each system is characterised by the mode of processing employed (batch or on-line) and; the extent of the bibliographic files of library materials on the system: whether bibliographic records of all items in the library's collection, irrespective of their circulation status, are held on the system's circulation files (inventory), or bibliographic details of only those library items that have been borrowed from the library are held on

the system's circulation files (absence). Since we have examined the concepts of 'batch-operated' and 'on-line real-time' in the preceding sections, we shall briefly review what 'absence' and 'inventory' systems entail.

#### 4.8.1 Absence Systems

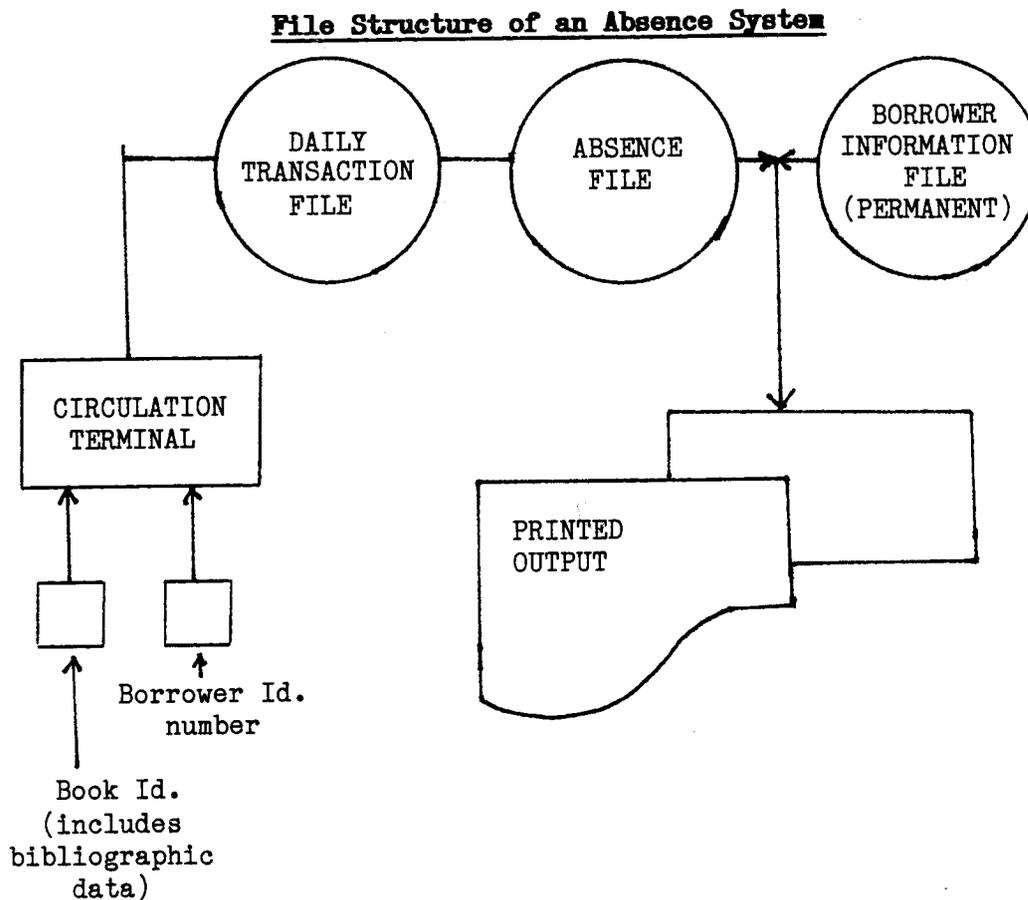
Absence systems, variously known also as 'loan file' systems 'exception file'<sup>32</sup> systems, are those systems whose loan files consist only of details of materials that have been charged out of the library. In other words, details of materials that are 'absent' from their assigned locations in the library are kept. McGee describes the essential features of an absence system as follows:

"Absence systems usually contain three main logical files: (a) a user file; (2) an absence file that contains records only for charged or otherwise absent items; and (3) a transaction file. User identification number and complete item data ... are input at transaction to create charge records. These data are typically collected from machine-readable sources such as punched cards or magnetic strips; time data such as charge date or due date, and circumstantial data, such as charging location may also be collected..."<sup>33</sup>

In an absence file system, details of library items being borrowed are captured at the time the materials are charged out. And the discharge function is accomplished by purging the record of the returned items from the circulation file. Since absence file systems do not contain a permanent record on file but a 'transitory' one, surrogates (bar coded labels, OCR labels, etc.) containing details of the library's item's identification (e.g. author, title, classmark, accession number, etc.) have to be necessarily more detailed than in inventory systems.<sup>34</sup>

The figure below illustrates the basic file structure of an absence system:

Figure 7



SOURCE: Barbara Evans Markuson, Automated circulation control systems: an overview, Library Technology Reports (July-September, 1975), 8.

#### Advantages of Absence Systems

Economical. The major advantage of absence systems is that they are economical in the sense they require less storage space and less CPU processing because the files in these systems contain only records of materials that are in circulation.<sup>35</sup>

#### Disadvantages of Absence Systems

Absence systems have the following shortcomings:<sup>36,37</sup>

1. they provide statistics only about items that are in circulation, (i.e., those library items that are charged out). Internal usage of the collection, for

instance, for items located in closed access areas, reference, etc. are not reflected in the statistical and other management information provided by these systems, and;

2. incomplete item identification. Information on details of items on loan is limited by the capacity of the coding medium used, e.g. bar coded label, magentic strip, etc. If an item has a long title (e.g. dissertations, theses), and because of the limited capacity of the coding medium the title may have to be truncated. Sometimes truncated titles are difficult to identify.

#### 4.8.2 Inventory Systems

Inventory systems, also known as 'stockfile', 'item' systems, are those systems in which details of all items in the library's collection, irrespective of their circulation status are held in machine-readable form in the circulation file. McGee describes the essential features of an inventory system as follows:

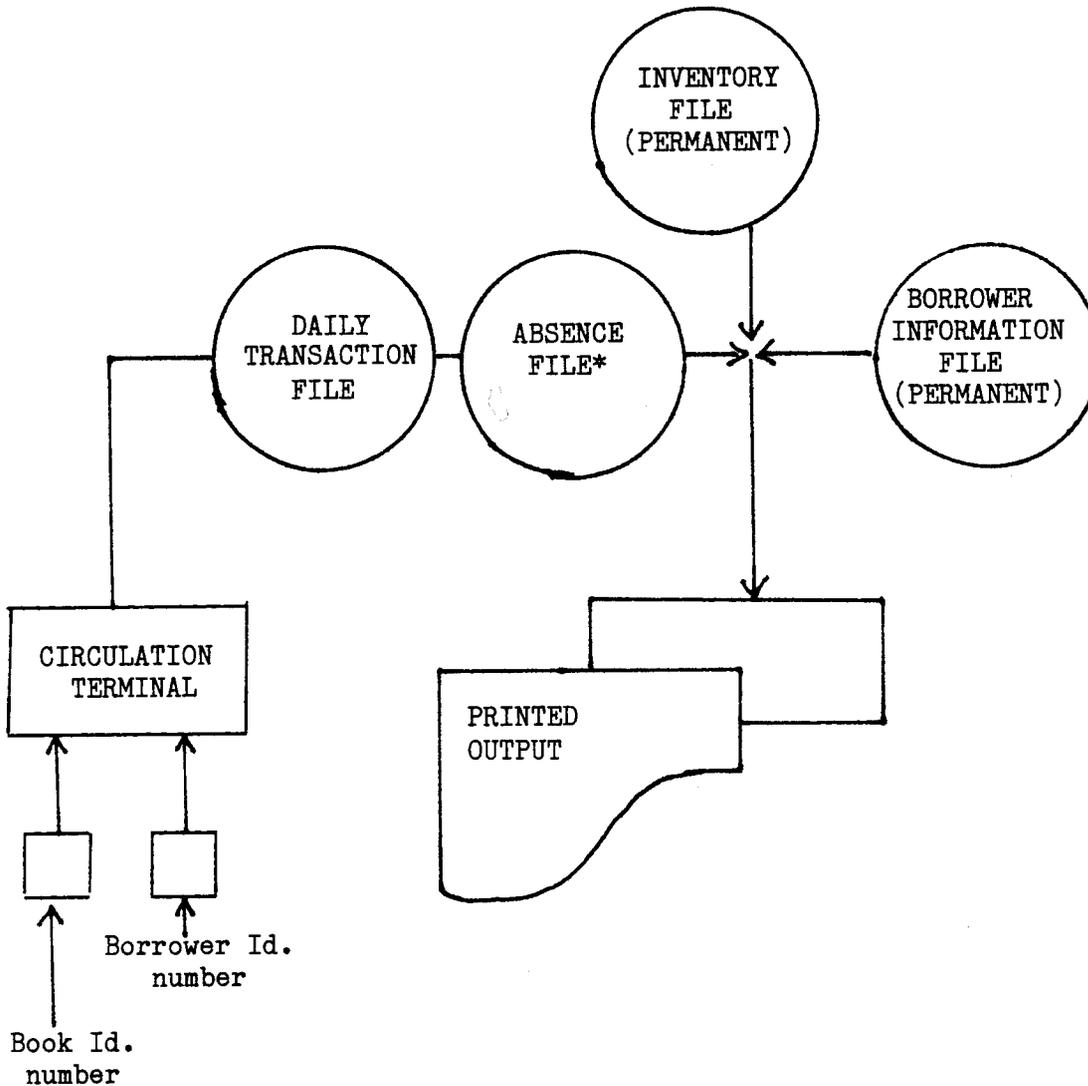
"Item systems are characterized by three or four major files: (1) a user file; (2) an item file of bibliographic records for all library volumes or titles ...; (3) a transaction file that may be used for update of the item file, data collection and analysis, and perhaps notice generation; and optionally (4) an absence file of records for circulating items ..."<sup>38</sup>

The charging of materials involves 'flagging' the record of the item being borrowed by using a unique item identification number, an accession number, control number bar coded, or OCR coded, etc. on a label stuck on the item, together with the user identification number similarly coded on the user identification card. The discharge function is accomplished by deleting the flagging from the item. But the bibliographic record of the item is never erased. And placing reservations and other trapping functions on library items is done by simply flagging the concerned items as under the charging process above.

The figure below illustrates the basic file structure of an inventory system:

Figure 8

File Structure in an Inventory System



\*In some systems, items in circulation are flagged in the inventory file and an absence file is not used.

SOURCE: Markuson, Automated circulation control systems, 8.

Advantages of Inventory Systems

Inventory systems have the following advantages:

1. inventory systems provide information on the status of all items in the library's collection, including their loan status, location, etc. And depending on the mode of operation of the computer system used,

the availability of the information may be instantaneous for on-line systems or periodic for batch-operated systems.

2. they provide detailed statistics and other management information on the usage (or lack of) of all library materials;
3. inventory systems provide a basis upon which a public access information system can be developed. And this would facilitate reader access to the library's collection, and;<sup>39</sup>
4. with an inventory file, it is easier to develop an integrated library system where various units of the library, e.g. cataloguing, acquisitions and circulation control could use a common database. With such an arrangement data creation in the library is rationalised and duplication in the process of record creation is eliminated.

#### Disadvantages of Inventory Systems

Inventory systems have the following weaknesses:

1. Costly. Perhaps the major disadvantage of inventory systems is the high costs associated with these systems. Since the bibliographic details of all items in the library's collection have to be converted to (and held in) machine readable form, these systems inevitably require more storage capacities. Further, a large database requires more CPU processing for both the storage and retrieval of records. Added to these is the effort in manpower, time and money required to convert all the records of the library holdings to machine readable form, and;
2. Wasteful usage of storage. Studies have shown that, generally, only one fifth of a library's collection account for the majority of the total circulations of a library. And putting records of materials, a majority of which rarely circulate, on expensive storage media, is wasteful.

Having examined the concepts of "absence" and "inventory" systems, we now briefly consider the four types of automated circulation control systems.

#### 4.8.3 Batch-operated Absence Systems

These are absence systems operated in batch mode. Under these systems, pre-punched cards containing details of library items are

held in the items. The charging process involves punching details of the user's identification (id. number, etc.) and due date onto the cards (of the items being charged out). Printouts are then made showing what items are charged out and when they are due back for return. Overdues are similarly identified by periodic running of the circulation files and identifying items that have not been returned after a given due date. And the discharge process involves matching the returned items' id. with the circulation file and deleting those which match.

#### Advantages of Batch-operated Absence Systems

Batch-operated absence systems are the least costly of the four types. Since only the records of materials that circulate are converted to machine readable form, the size of the loan file is smaller, and can therefore be implemented very quickly. Other advantages are as noted under batch operated systems elsewhere in the chapter.

#### Disadvantages of Batch-operated Absence Systems

The major weakness of these systems is their inability to provide current information on the status of all materials in the collection of a library. Further, these systems only provide statistics and other management information only on materials that are charged out of the library. Internal usage of such busy areas of the library as the short loan collections is not reported. Other weaknesses are as noted under batch-operated systems in the preceding sections of the chapter.

#### **4.8.4 Batch-operated Inventory Systems**

In batch-operated inventory systems, bibliographic details of all library holdings are converted to machine readable form and held in

off-line storage media such as magnetic tapes or disks. And punched cards, or other coding media such as OCR, bar coded labels, etc. which contain brief details of the library item such as a unique id. number of the item, are held in the item. The charging routine involves collecting details of items being borrowed (e.g. unique item number), details of the borrower (e.g. borrower id. number), and merging these with the library holdings file. Printed lists show items on loan and when they are due back for return. And the discharging routine involves matching item id. number against the library's master holdings file and deleting the loan details (borrower, due date, etc.) from the item's record in the file. Overdues are similarly identified by periodic printing of the master list and checking those items that remain outstanding past their due dates, and preparing relevant notices to the delinquent patrons.

#### Advantages of Batch-operated Inventory Systems

Holding all the records of the library's collection in machine readable form, affords the library the advantage of not having to reconvert the whole file all over again once the system is changed to full on-line real-time mode. It also gives the library the potential of using these records in machine readable form, once it converts to on-line real-time mode, for a host of other uses such as public access catalogue, shelf list, etc. Further, the system helps the library obtain more detailed statistics and other management information on the use (or lack of) of the whole library collection. And this information can be used for planning, improving, and introducing new services. Other benefits of batch-operated inventory systems are as noted under batch operated systems.

### Disadvantages of Batch-operated Inventory Systems

The major criticism of these systems is that they collect some redundant data which cannot be used even for public access purposes since it is held in machine readable form off-line. And the information it provides on the status of library items is not current. Other disadvantages are as noted under batch-operated systems in the preceding sections.

### 4.8.5 On-line Real-time Absence Systems

In on-line real-time absence systems, only details of items being charged out together with details of the borrower and the due date are collected. The loan record is held on file until the library item is returned. Once the borrowed item is returned, the loan record is deleted from the circulation files.

### Advantages of On-line Real-time Absence Systems

The major advantage of the on-line real-time systems is that they are economical in the sense the size of the loan file is dependent on the volume of circulations. Compared to inventory systems, absence systems need much less storage capacities as well as computer processing because they hold and process less records. Further, absence systems make a more efficient use of records stored in these systems because they only keep records which have immediate active usage - no redundant records are held on these systems.

### Disadvantages of On-line Real-time Absence Systems

These systems only provide details of the status of library materials that have been charged out. And statistics and other management information provided by these systems are not representative of the whole collection of the library but only those that are charged out. Further, since no bibliographic records of the library's holdings are

held in machine readable form prior to charging library items out, it becomes necessary that details of the library items on coded item surrogates such as bar coded or OCR coded labels, magnetic strips, etc. provide as much information as possible for items charged out to be properly identified. But these coding media can only take a limited number of characters, which in most cases are inadequate for proper item identification. And for long titles to be properly identified especially when preparing overdue notices, it might become necessary to consult other files manually for full bibliographic details, thus in effect defeating the very purpose of automation.

#### 4.8.6 On-line Real-time Inventory Systems

Under these systems bibliographic details of all the library's collection, irrespective of their circulation status, are held in machine readable form on file in on-line real-time mode. Another file of all the qualified borrowers containing details of their names, addresses, borrowing status, special unique borrower numbers, etc., is held on-line in machine readable form. The charging process involves either flagging the master on-line file of the library's holdings with item id. number (held on the item being borrowed) and the borrower's id. number (from the borrowers card), or creating a brief absence file which is deleted when the borrowed materials are returned to the library. And the discharging routine involves deleting the 'flagging' information from the bibliographic record.

#### Advantages of On-line Real-time Inventory Systems

On-line real-time inventory systems have the following advantages:-

1. they help the library keep track of the status of all library materials at all times;
2. the bibliographic master file held on-line could be used for public enquiry purposes;

3. the bibliographic master file could be used in the creation of an integrated library system linking acquisitions, cataloguing, circulation and public access catalogue system. An integrated system helps to cut down on duplication in the record creation process because once one set of data is created in say, acquisitions, it can easily be transferred to other units of the library and used for whatever purpose with slight modifications at little or no extra cost, and;
4. these systems give detailed statistics and other management information on usage (or lack of) of the whole library collection.

#### Disadvantages of On-line Real-time Inventory Systems

The major disadvantage of these systems is the high cost of storage, computer processing and creation of the machine readable files. The other major weakness of these systems concerns the maintenance of redundant records on expensive on-line storage media. This is so in the sense that some items whose records are held on these files hardly ever circulate at all.

#### Comparison of Computer-based Systems with the Model

Both batch-operated systems satisfy the minimum requirements of marrying details of items on loan and those of the borrower. They also provide other useful information such as statistics on the use of the collection. But, as our discussions on these systems have shown, both systems fail to satisfy all the requirements of the model for the following reasons: they do not provide current information on the status of all library items; they are unable to place effective traps on delinquent borrowers, overdues, overborrowing, reservations and recalled library items. Further, the files in these systems cannot be consulted directly at the circulation desk because they are in machine readable form, and one has therefore to rely on often dated printouts from these systems.

On-line-based systems seem to meet almost all the requirements of an ideal circulation control system as outlined in the model. They can provide current information on the status of library items at any time. But there are some different approaches to the design of these systems, as the discussions in the preceding sections have shown. While on-line absence systems can only provide current information on what has been charged out, inventory systems can, ideally, provide information on the current status of all library items irrespective of their circulation status. Similarly, while absence systems' provision of statistics on collection use is limited by the materials that are charged out of the library, inventory systems provide statistical and other management information on the whole collection. These differences between absence and inventory systems have economic implications in that absence systems require less storage and computer processing than do inventory systems, and are, therefore, less expensive than the latter. But all things being equal, on-line inventory systems, inspite of the high costs associated with them, satisfy all the requirements of an ideal circulation control model as outlined in chapter two. And because future trends in library automation point towards distributed and integrated library systems, one is, therefore, inclined to recommend these systems for circulation control. On the next page, we reproduce Surace's conceptual model of such an integrated on-line circulation control system with interfaces to cataloguing, acquisition and bibliographic subsystems.



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**CHAPTER FIVE**  
**DESIGN CONSIDERATIONS**

**5.1 Introduction**

The process of automation is an expensive and high risk business which could result in huge financial losses if not well-executed. Like in any other major undertaking, good foreplanning is essential for the successful implementation of an automation project. In this chapter we examine some of the issues to be taken into account during the planning process. Although this study is specifically addressed to circulation control, the design considerations apply to other aspects of library automation such as cataloguing, acquisitions and ordering, serials control, etc.

Before considering aspects of system design, a library will already have done the preliminary phase of the automation process: chosen an automation project team with clearly defined terms of reference, and; by using such techniques of systems investigation as systems analysis, done a detailed study of the current system - identifying and defining problem areas, strengths and weaknesses of the current system and defining the objectives of the desired system. Defining the objectives of the desired system is important for two reasons:

1. defines what the desired system will be expected to do, and from this;
2. a definition of the type of system to meet these objectives can be worked.

From here other design aspects, to which this chapter is addressed, follow.

## 5.2 Design Issues

There are many issues to be considered during the design process and in this chapter we will only look at some of them. For our purposes, we have chosen the following seven design areas for consideration:

1. hardware/software;
2. type of system;
3. record structure;
4. implementation;
5. costing;
6. funding;
7. impact of automation on the organisation.

### 5.2.1 Hardware/Software Considerations

Considerations here include the following:

- Whose computer to use. Does the library use its parent institution's facility, purchase its own stand-alone turnkey system, use a computer bureau, or join a library co-operative. Pertinent to this is the question of software: to develop it in-house or purchase it from software vendors. These issues have been discussed in detail in chapter 1 (1.7). If the library decides to purchase a turnkey system there are also many other issues to be taken into account before acquiring the system: the reputation of the turnkey vendor, performance of the system, whether the system is installed in other libraries, contract negotiation with the vendor, etc. Boss,<sup>1</sup> Boss and McQueen,<sup>2</sup> Tedd,<sup>3</sup> Markuson,<sup>4</sup> Bahr,<sup>5</sup> Dranov,<sup>6</sup> Hegarty,<sup>7</sup> Matthews,<sup>8</sup> and Burke<sup>9</sup> all give useful criteria to be taken into account when acquiring a turnkey circulation control system;
- Location of the computer. Even if the library is to purchase a turnkey system a decision has to be made as to where to locate it. Should it be housed in the parent institution's computer centre or within the library; whether the library should have a centralised computing facility or decentralised one. This last

point is especially pertinent for libraries with branches located at multiple sites dispersed over a wide geographic area.

- Location of terminals. Look at how many terminals, VDUs, etc. will be located at particular workstations.
- Integrated or single application. A decision has to be made as to whether the desired system will be a single application (e.g. for circulation control) only, or whether it will be an integrated system with interfaces to other library applications, e.g. cataloging, acquisitions, serials control, etc.
- Telecommunications hardware. The relevant telecommunications equipment required for the system should be considered as part of the hardware requirements of the system.
- Data capture devices. Data capture units such as OCR machines and readers, or magnetic strip coders/readers; or barcoding/barcode data capture units such as light pens, etc. must all be included in the consideration of hardware including the location of peripheral devices such as printers.
- Mode of operation. The system's mode of operation should be decided whether it will be a batch-operated or on-line real-time system.

### 5.2.2 Type of System

In chapter 4 (4.8) we identified four types of automated circulation control systems:

- on-line absence systems;
- on-line inventory systems;
- batch-operated absence systems, and;
- batch-operated inventory systems.

A consideration of the type of system to be used must also be borne in mind during systems design.

### 5.2.3 Record Structure

Record structure is used here to refer to the extent of the bibliographic record of the item being borrowed: whether the record of the loan item will have full bibliographic details as set out in

the MARC format, or whether it will contain brief bibliographic details such as author, title, classmark, ISBN/ISSN, accession number, year of publication and publisher; and, whether the records will have fixed variable length fields, etc.

#### 5.2.4 Implementation

Daniels and Yeates define implementation simply as "... the practical job of putting a theoretical design into practice ..."10 Since implementation is what actually brings an automation project to fruition, it is of the utmost importance that this process is well planned for. Among the elements of systems implementation are the procurement of the necessary inputs into the proposed system--machinery, materials, personnel, buildings (accommodation), etc.; installing the new system; preliminary testing; and finally, switching from the old to the new system. To this end, planning for implementation should include the following considerations:

- Record conversion. Converting records from manual to machine readable form is one of the most expensive and time-consuming aspects of the whole implementation process. Consideration as to how this is to be done should be done from the outset. A library would, for instance, have to make a decision as to whether record conversion would be done locally, or the library would hire the services of a commercial company, or records would be purchased from a bibliographic utility and downloaded onto the library's system, etc.
- Timing of implementation. A realistic schedule of implementation must be made. This should include a decision as to whether implementation will be staggered over a period of time or whether the changeover from the old to the new system will take place on a given date; whether the old and new systems will run concurrently for sometime before gradually phasing out the old system.
- Training of system users. The training of system operators is an essential feature of the process of implementation. System operators include both library staff as well as library users. Both of these groups will need to be trained on how to use the system, e.g. for a computer-based circulation control system which also includes a public enquiry module, users will

obviously need to be trained on how to use the system if they are to effectively benefit from the services the system is offering.

- Need for a standby facility. While it is true that implementation is the process that sees the fruition of a theoretical design, it is also true that implementation is a period of trial and error - things might go right or they might go wrong. The history of implementing computer-based systems is littered with stories of initial partial-successes and complete failures, while stories of a complete initial success are seldom heard. The recent failure of the automated system, thirty minutes after its launching, during the London Stock Market's 'Big Bang' day is a case in point. It is, therefore, important to have a standby facility handy in case the new system fails to run, resulting in disruption to services.

#### 5.2.5 Costing the System

Libraries normally have a hard time justifying to their funding agencies the huge expenses that go with automation projects. And they risk being forced to abandon an automation project half way through implementation. This could be due to a number of factors, one of which may be the wrong original estimates made of the costs of the project upon which the funding agency based its allocation to the library. Bearing in mind the fact that these same funding agencies have to attend to similar demands from other departments, libraries will have an even harder time justifying extra requests for funding for the same project. The need for proper and full costing for an automation project is crucial for its smooth execution. Among other things, costing for an automation project should include the following essential elements:

1. hardware/software costs;
2. site preparation costs;
3. staff costs;
4. telecommunications costs;
5. maintenance costs.

- Hardware/software costs. These are costs that go towards the purchasing of the hardware/software for the system as discussed in section 5.2.1 above. If software is to be developed in-house by either local staff or hired consultants, this should be costed separately from the hardware.
- Site preparation costs. The installation of a computer system normally entails the preparation of special accommodation for the computer that is air conditioned, humidity controlled, and in certain environments such as tropical countries, there might be also need for dust filtration of the computer room; special furniture, e.g. tables for terminals, VDUs, swivel chairs for staff etc., need to be acquired and installed; fittings for electrical cables and other connections between the computer and terminals at workstations need to be made; a ready source of power supply is essential for the proper functioning of the system, and this should be prepared well in advance of the installation of the system; in addition to the last point, a reliable standby power facility which will allow the computer to shut down gradually giving the computer ample time to update the records without losing data due to a sudden loss of power from the main source of supply, e.g. during an electrical power failure.
- Staffing costs. An automation project might necessitate the hiring of technically qualified staff to run the computer system (if it is a fairly large system), temporary staff, e.g. extra key operators to help during record conversion, consultancy fees etc., all must be included in staff costing.
- telecommunications costs. Telecommunications costs are rarely mentioned in the literature on automation projects and yet they make up quite a large proportion of the total cost of an automation project. For instance, at one of the libraries with multiple site branch libraries visited by the author in London, costs for telecommunications equipment (and its installation) accounted for up to a third of the total cost of the system.
- Maintenance costs. Maintenance costs for equipment and software maintenance, telecommunications charges etc. must always be taken into consideration.
- Installation costs. Unless the installation costs are included in the package for the hardware and software, these must be costed separately. These may include among other things, fees for engineers installing the computer system, fees for loading and testing the software etc.

Barkalow<sup>11</sup> gives a good tutorial on the various aspects of costing an automation project.

#### 5.2.6 Commitment of the Funding Authority to the Project

Before embarking on an automation project it is important to first obtain firm commitment of financial support for the project from the funding authority. To indemnify itself from possible legal action by its contractors, (e.g. hardware or software suppliers etc.) due to the library's inability to meet its financial obligations to the same as a result of the withdrawal or inadequate support from its funding authority, the library must ensure that this is done in a legally binding document.

#### 5.2.7 Impact of Automation on the Organisation

Automation is an agent of change. And change being what it is, affects people, organisations and units within the organisation, and the environment in which the organisation is operating, differently. At organisational level, automation may necessitate changes in the following areas:

- administrative procedures;
- organisational structures, e.g. departments may be merged, abolished or new ones created;
- staffing patterns, e.g. there may be need to recruit more technically qualified staff, transfer staff from one department to another or terminate the services of certain sections of the workforce;
- work pattern changes, e.g. with the installation of an automated circulation control system the preparing of notices (e.g. overdue, recalls) may be done automatically by the computer, although instead of writing them out manually, the operator might now have to instruct the computer to prepare and print out the required notices.

At individual level, change may affect individuals in an organisation differently - some may gain from the introduction of change, e.g. get

more responsibilities, more pay etc.; others may lose their status, responsibilities, get demoted or declared redundant as a result of the introduction of change; while others might experience neither personal gain or loss from the introduction of change.

At the environmental level, change may affect the environment reacting with the organisation introducing, say, a new technology. For instance, when a library introduces a computer-based circulation control system the users (the environment) may be served faster at the issue desk, more services may be introduced, and borrowing limits may be enforced much more strictly, overdues may be easily identified and fines easily calculated, etc. All these changes might affect users differently, some might like the computer-based system because it facilitates the reservation of library materials, while others might not like it because the system can easily detect over-borrowing, or it may not allow them to charge out library items until the overdue fines flagged against their names are settled.

The success of the introduction of change will, to a great extent, depend on the co-operation of the people affected by that change (e.g. staff and users). As Damodaran points out:

"... the process of introducing change is in itself a crucial determinant of human reaction to change..."<sup>12</sup>

The way change is introduced, will, in most cases determine how people react to it.

Since the success of the introduction of change is dependent upon the reaction of the people who operate in the changed environment, management of change becomes very crucial. And one of the ways of minimising resistance to change, is to involve the recipients of change (operators and users) from a very early stage of the

automation process (from systems analysis, through to implementation). As Damoradan correctly points out:

"...involvement in the early plans for change is necessary to gain understanding and cooperation of the recipients of change..."

And argues that user involvement helps to:

"...(a) achieve congruence between system facilities and user needs, (b) reduce or avert negative consequences of change and (c) gain user commitment and cooperation in system usage".<sup>13</sup>

User involvement in the process of change can be achieved through many avenues, two of which are:

- communication, and;
- consultation.

Both of these can be achieved through publication of a newsletter, bulletin, leaflets and notices etc., explaining and giving progress reports on, say an automation project; meetings with the people (or their representatives, e.g. unions) to be affected by the project where opinions are solicited, clarifications are sought and made, fears are expressed, confirmed or allayed etc. Surveys and interviews can also be used for collecting views and opinions of people on a given issue. In this way gossiping, rumour mongering, and speculation are put to rest, and the project can proceed without the hindrance of ignorance of its purpose on the part both the implementors of change and the recipients of change.

In a nutshell, all the possible impacts of the introduction of an automated system on system operators, the organisation, and the general environment in which it will take place should be carefully analysed, and ways and means of dealing with them identified.

### 5.3 Summary

In the preceding sections we have briefly looked at some of the design issues which are crucial for the successful execution of an automation project. The following have been identified as being pertinent to the issue at hand: hardware and software issues; type of system to acquire - whether it will be an on-line or batch-operated, inventory or absence system; the record structure of the system's bibliographic file - full MARC or brief MARC; planning for implementation; costing of the automation project; consideration of the commitment of the funding authority to the automation project, and; the impact of automation on the organisation introducing an automated system.

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## CHAPTER SIX

### UNZA LIBRARY: ANALYSIS OF THE CURRENT CIRCULATION CONTROL SYSTEM

#### 6.1 Introduction

In this chapter we present a brief description of the current circulation control systems in use at the University of Zambia Library (UNZA Library). And in order to put the library's circulation control systems in their proper institutional and organisational perspective, brief historical and organisational outlines of the University of Zambia and the UNZA Library are presented first.

#### 6.2 The University of Zambia: Historical Outline

The University of Zambia was founded in 1965 under the enabling University of Zambia Act of 1965. This followed the publication, in January 1964, of the Committee of University Experts' report. The Committee, which was formed in the early 1960s under the chairmanship of the late Sir John Lockwood, was charged with the responsibility of investigating the possibility of establishing a University in Northern Rhodesia. As a result of the Committee's report, popularly known as the 'Lockwood Report', which highly recommended the establishment of a university in Northern Rhodesia, a Provisional Council of the university was set up during 1964.<sup>1</sup> Later, in October of 1964 Northern Rhodesia became the Republic of Zambia as the territory attained political independence from the United Kingdom. And the new government was quick to implement the proposals for a

university. The need for an institution of higher learning for the new nation was even more urgent considering the fact that at the time of independence there were only about 100 university graduates and about 1000 holders of high school certificates in the country.

The 1965 University Act gave the Provisional Council statutory authority and it (the Provisional Council) established a senate which became responsible for academic affairs of the university. In 1969 the University Act was amended resulting in a definitive constitution of the university, and a full University Council replaced the Provisional Council as the institution's supreme governing body. The Act was amended again in 1979, and among other things, it provided for the development of universities at three constituent institutions at Lusaka, Ndola (on the Zambian Copperbelt), and Solwezi (in Northwestern Zambia), see map on the next page.

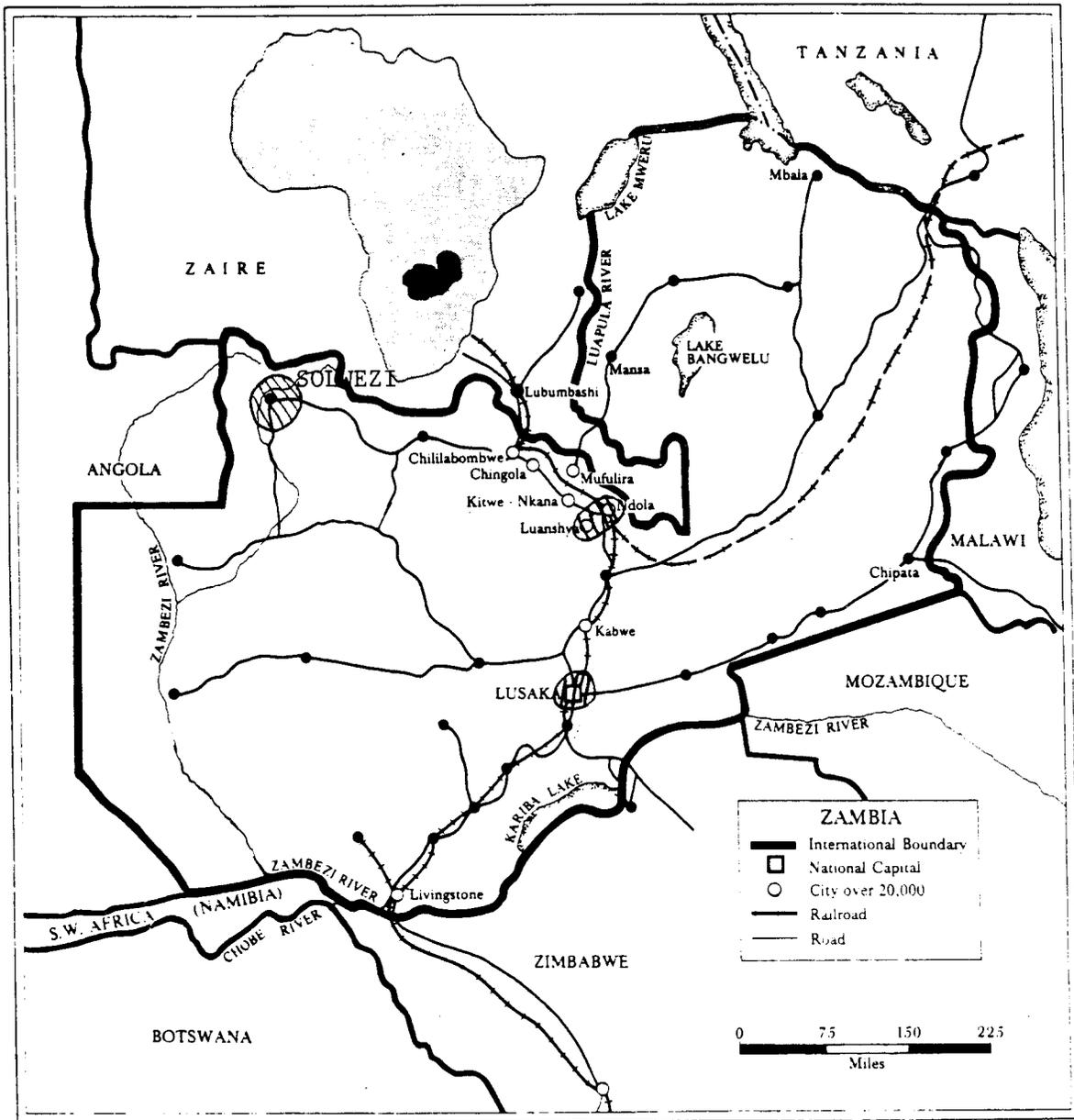
#### 6.2.1 Mission of the University

Conscious of the important role of university education in national development, it is not surprising that the founding fathers of the University defined its mission as follows:

"It shall be the general function of the university to encourage the advancement of learning and research throughout Zambia and hold out to all persons whatever their race, place of origin, political opinions, colour, creed or sex the opportunity of acquiring higher education and for the purpose of carrying out such function it shall be the duty of the University so far as its resources permit: (a) to provide facilities appropriate to a university of the highest standing for the pursuit of learning and research and for the acquisition of a liberal education responsive to the needs of Zambia; and (b) to make these facilities available on proper terms to persons as are equipped to benefit from the use of the facilities."<sup>2</sup>

Figure 10

Zambia: Location of University Zambia Campuses



Key:  Location of University of Zambia campuses

Adapted from Black Africa: a comparative handbook by Donald George Morrison et.al. (New York: The Free Press, 1972), p.377

### 6.2.2 Constituent Institutions

The University admitted its first batch of 312 students in 1966.<sup>3</sup> It first operated from the premises of the former Oppenheimer College of Social Service (which was incorporated into the University), while construction work on what has become the main campus of the University at Lusaka, along the Great East Road, was still in progress. During the academic year 1967/68 some of the faculties moved to the new site still under construction along the Great East Road.<sup>4</sup> The campus of the former Oppenheimer College now houses the School of Medicine and is known as the Ridgeway Campus (of the University at Lusaka).

The University at Lusaka has nine schools (or faculties) including Education; Law; Humanities and Social Sciences; Engineering; Mining; Natural Sciences; Agricultural Sciences; Veterinary Medicine and; Medicine. The first eight are located at the main campus along the Great East Road. In addition to the schools there are a number of many specialised departments and research institutes located at both the main and Ridgeway campuses.

The University at Ndola admitted its first batch of 84 students in 1978.<sup>5</sup> The university is currently temporarily located at Kitwe, a mining centre on the copperbelt, on the premises of the Zambia Institute of Technology, awaiting the development of its permanent campus at Ndola. This university specialises in business, industrial and environmental studies, offering degrees in business administration, accountancy, architecture, building, and urban planning.

The University at Solwezi is to specialise in agriculture and related sciences. But the Solwezi campus has not yet been developed.

### 6.2.3 Governance of the University

The Head of State is the Chancellor of the university. The university has a federal administrative structure headed by the Vice-Chancellor (V.C.), who is also the university's chief executive. The V.C.'s federal team includes the Deputy V.C., the University Secretary, the Chief Librarian, and the Financial Controller. Each constituent institution is headed by a campus principal. The general policies of the university are made and implemented by the University Council, Senate and Campus Academic Boards.

#### 6.2.3.1 The University Council

The University Council is the University's supreme policy making body. It is headed by a chairman appointed by the Head of State. Other Council members are drawn from government, academics from outside Zambia, academic staff of the university, representatives of districts of where the constituent institutions are located, representatives of graduate and undergraduate students and senior federal and campus officers. The Council also makes appointments of Senior Academic and administrative staff of the university.

#### 6.2.3.2 The Senate

The Senate is the supreme policy making body over all academic matters of the university. It reports to the Council. Membership of the full Senate includes the senior federal officers mentioned elsewhere (governance), deans of schools, directors of research institutes, representatives of academic boards, student representatives, principals of constituent institutions, and two lay nominees of the V.C. (Chairman). The Senate is made up of several

specialised committees which oversee the activities of various bodies affiliated to the university, each of which is chaired by the V.C., e.g. Senate Finance Committee is responsible for financial affairs of the university, the Senate Library Committee is the university Library's supreme policy making body, etc.

### 6.2.3.3 Academic Boards

Academic Boards are answerable to the Senate. They superintend the academic activities of each constituent institution. Membership of the Boards includes Principals of constituent institutions (chairman) deans, campus Librarians, Registrars (of constituent institutions) resident directors of research bureaux, student representatives and other academic staff. Like the Senate, Academic Boards are also made up of several specialised campus-wide committees, each of which is chaired by the principal of the constituent institution.

### 6.2.4 Student Population

The total student population is just under 4000 students. The table below gives the breakdown as of 1984:

Table 2

#### University of Zambia Student Population

Campus	Students	
	Full-time	Part-time
Lusaka	9149	134
Ndola	479	16
Totals	3628	150

SOURCE: Commonwealth Universities Yearbook, 1985.  
(London: Association of Commonwealth Universities, 1985), p. 2349

### 6.3 UNZA Libraries

The UNZA Libraries support the university's teaching and research activities through the provision of requisite background reading materials to students and staff of the university. The first university library began operation in 1966 when the university formally began admitting students. The library of the former Oppenheimer College became the university's prototype library. The collection of the main library began moving to the new site along the Great East Road Campus during the 1967/68 academic year.<sup>6</sup> It remained housed in temporary accommodation on the new site until 1969 when construction work on the library building was completed. The new university library building was officially opened by His Excellency the President of the Republic of Zambia, Dr. K.D. Kaunda.

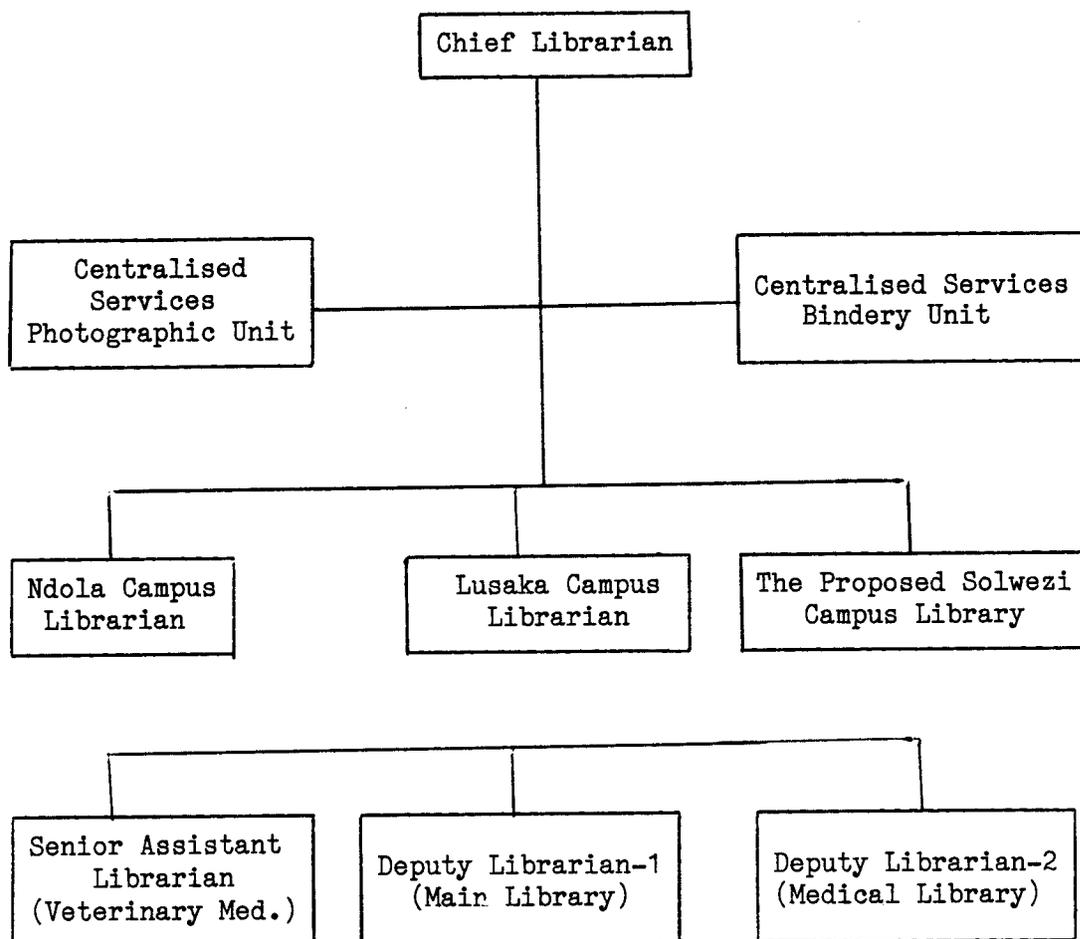
#### 6.3.1 Organisation

UNZA libraries, like the university, have a federal organisational structure, with the Chief Librarian as the chief executive officer of the system. The library at each constituent institution is headed by a campus librarian. At the moment the Ndola Campus has only one library. The Library at the Lusaka Campus has, in addition to the main library, two branch libraries located at the School of Medicine at the Ridgeway Campus, and the other one is located at the newly commissioned School of Veterinary Medicine, about half a mile from the main library. Also affiliated to the main library is the documentation centre serving three research institutes (the Institute of African Studies; Rural Development Studies Bureau and; the Institute of Human Relations) located at the 'Munali campus' about two miles from the main library. When the university at Solwezi is developed its library will fall under the library's federal

organisational structure. The chart below summarises the libraries' organisational and administrative structure:

Figure 11

UNZA Libraries Organisational Structure



6.3.2 Governance

The governing bodies of the library system are the same as those of the other academic units of the university. And they include the following:

6.3.2.1 The Senate Library Committee

The Senate Library Committee is the libraries' supreme policy making body. The membership of this Committee includes the V.C. (Chairman) Deputy V.C., Chief Librarian, Principals of the constituent

institutions, directors of research bureaux, representatives of schools and two outstanding librarians from outside the university.

#### 6.3.2.2 The Campus Academic Boards-Library Committees

There is an Academic Board Library Committee at each constituent institution. These Boards report to the Senate Library Committee, and they superintend the activities of the library at each constituent institution. Membership of these Boards includes the principal of the constituent institution where the library is located (chairman), the registrar, campus librarian, representatives from schools and research institutes, and senior library staff. At the moment there are two library Boards for university libraries at Lusaka and Ndola campuses.

#### 6.3.2.3 The Library Administrative Coordinating Committee (LADCC)

The LADCC is the library's own policy making body. Policy matters affecting libraries of all the constituent institutions are handled by this body before they are presented to the respective Academic Boards and the Senate for consideration. Membership of this body includes the chief librarian (chairman), campus librarians from each constituent institution, deputy librarians, and some senior library staff.

#### 6.3.3 Role of the University Libraries in the University

As with other university libraries in the world, the main purpose of the university library is to support the teaching and research programmes of the parent institution through the provision of the requisite materials. Indeed, the UNZA library is very much aware of its mission which it <sup>has</sup> ~~was~~ defined as follows:

"The key objectives of this university are to teach, undertake appropriate research, and to render service to the public. The main function of the University Library is to provide facilities that enable the University to accomplish these three basic objectives. For this reason, therefore, this university library is designed primarily to serve the learning, reading and research needs of its students, teaching staff, research affiliates and researchers."<sup>7</sup>

But unlike most university libraries whose definition of their mission normally ends with the statement above, the UNZA Library finds itself in a unique situation of having to extend its facilities to the public at large. Being by far the largest library in the country, in terms of the collection and its diversity, staff and financial support, it was only logical that a public funded institution like the university library extended its services beyond its traditional boundaries. The library's broader role as a source of information for the general public was recognised very early in the formative years of the institution. In 1969, at the official opening ceremony of the University Library building of the main library, President Kaunda declared the University Library the National Reference Library.<sup>8</sup> A commemorative plaque unveiled by the President at the opening ceremony carries the following legend:

"Let this legend of self sacrifice on the part of poor people never be forgotten by generations to come. Let it remain as an inspiration to all so that every good that shall come out of this building shall be to the greater glory of the people."<sup>9</sup>

The library thus serves both the institutional needs of the university and its community as well as the national needs of the public at large. This dual role is reflected in the library's policy of allowing members of the general public access to the library's collection for both reference purposes and/or for borrowing library materials under conditions set by the library. The library's policy

of collecting on as wide subject coverage as possible e.g. Zambia, United Nations and its specialised agencies, Zambian government documents, government documents of East, Central and Southern African countries, etc., in addition to the usual texts and other materials for supporting the academic programmes of the university, is geared towards meeting its dual role.

#### 6.3.4 Users of the University Libraries

The table below summarises the various categories of the users of the university libraries together with their borrowing rights.

**Table 3**

#### Users of the University Libraries

Category	No. of Tickets (Maximum Allowed)	Loan Period
1. Academic (Teaching, research, senior administrative university staff)	12	3 months
2. Students (undergraduates)	6	2 weeks
3. Postgraduate students	12	3 months
4. Research Affiliates	12	3 months
5. Non Academic (university staff)	6	2 weeks
6. External Borrowers (general public)	3	2 weeks
7. Correspondence (long distance learning students)	6	3 months
8. Institutional members	25	3 months
9. Departmental (Academic departments)	no limit specified	up to 1 acad.year

In addition to the above, as stated elsewhere in the chapter, members of the general public are free to consult the collections of the university libraries for reference purposes.

#### 6.3.5 The Collection and Organisation of Circulation Control

For the purposes of this study, only the library at Lusaka Campus was surveyed. And the description of the library system will therefore be heavily biased towards the circulation practices of the Main Library of the Lusaka Campus.

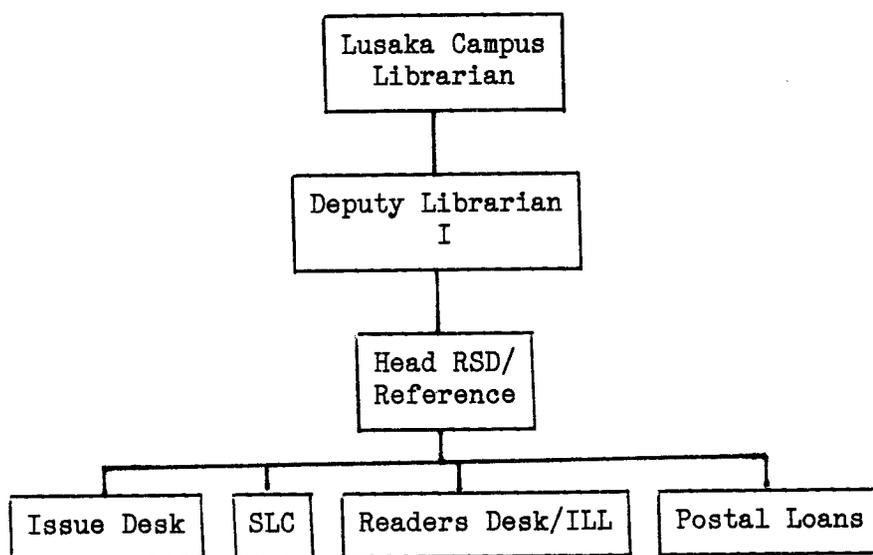
The Library at the Lusaka Campus of the University has a collection of about 300,000 volumes, including over 4000 periodical titles of which about 2000 are current subscriptions. The circulation of materials and the systems of circulation control employed vary according to the location and type of materials (i.e., whether the materials are located in a restricted access area, whether they are reference materials, etc.).

##### 6.3.5.1 The Main Library

Generally, the circulation of materials at the Main Library comes under the control of the head of the Readers Services Division. The organisation chart below illustrates the basic organisation of circulation control at the main library of the Lusaka Campus:

Figure 12

RSD Organizational Chart



The circulation of materials and the circulation control systems used as pointed out elsewhere in the Section, vary according to the location and type of materials (i.e., whether the materials are housed in a cased access area or not; whether they are reference or special collections materials, etc.). The bulk of the library's collection is housed on the open stacks. It is organised by subject based on the Library of Congress Classification scheme. Items located on open stacks are available for long term borrowing to bonafide users for periods ranging from two weeks to three months. Basically, the circulation of materials at Lusaka Campus libraries is done through the following units:

(a) The Issue Desk

The issue desk handles the circulation of all normal loan materials from the open stacks. Reader registration, the issuing, and administration of borrowers tickets is also done by this unit. The issue desk is open from 0830-1800 hours Monday-Friday and from 0900-1215 on Saturdays. It is closed on Sundays.

(b) The Reference Collection

The reference collection is normally reserved for use within the library and may not be taken out of the library. But in certain special cases reference materials are lent out for short periods (a few hours, overnight) on special loan to academic staff. The special loan for reference materials is effected by filling in a "Special Loan" slip (in duplicate) with details of book author, title, book number (accession number), date borrowed, date due, borrowers name, department, and signature. The loan is authorised by the Campus Librarian, who also signs the slip. The top copy goes with the borrower (as a receipt) and must be presented to the library security personnel at the library checkpoint. The duplicate copy is filed in a "Special Loans File". Upon the return of the reference item, the relevant loan slip is cancelled by crossing through the slip and initialing it (by the person receiving the returned item).

(b) Inter-Library Loans

The Inter-library loans (ILL) unit handles all ILL requests from outside the main library, including those from branch and Ndola Campus libraries. Normally only materials from the open shelves are available for ILL purposes. The charging process essentially involves filling in an ILL form (in duplicate) details of requested item(s) being lent out: author, title, book number (accession number), date of transaction, date the items are due for return, name and address of the requesting institution. The top copy is sent together with the requested items to the borrowing institution, and the other copy is filed in the ILL file. Upon return of the items individual volumes are checked against the list of the loans from the loans slip using the accession number, the loan record is cancelled and filed for statistics. Overdues are handled by writing to the

institution holding the library item(s) with a reminder to return the overdue items. Recalls are handled similarly.

(d) The Short Loan Collection

Heavily used items are usually placed in the short loan collection (SLC) area of the library. Normally teaching members of staff request the library to place titles in the SLC for a specified period (a term, an academic year, etc.). The SLC is a restricted access area. SLC materials may be borrowed for short periods, of about two hours per time (renewable), overnight, one day and certain categories of materials may be borrowed for up to three days. In order to distinguish these variable loan materials all SLC materials are colour coded according to their loan status (e.g. 2 hours, overnight, 1 day, 3 days). To borrow SLC materials, a user must have an SLC borrower's card issued by the library's issue desk to all qualified SLC users. The charging system used is a modified ledger system where each SLC item has a card containing the item's bibliographic details (author, title, accession number, class mark, etc.). Each card is designed to have space for 40-50 entries with columns where borrowers enter their name, computer number (for students), time the item is borrowed and their signature (acknowledging the transaction). The charging process simply involves borrowers filling in their details on the book card (as described above). The borrower's SLC card is attached to the book card, and this constitutes the 'loan record'. This is then filed alphabetically by author (or title of the borrowed item) in pigeon holes. Overnight, 1 day, and 3 day loans are stamped with an SLC stamp showing the date of the transaction. Upon the return of the items the loan record is retrieved from the pigeon hole files and after ensuring that the items are in good condition, the library

assistant initials against the borrower's entry on the book card and the SLC card is returned to the borrower. Overdue items are immediately assessed according to the variable loan period of the item (per hour, or day) the borrower's SLC card is impounded until the borrower pays the overdue fine. Damaged materials are similarly assessed for repair or replacement depending on the nature of the damage. The SLC system ensures that each borrower does not borrow more than one volume per time because each borrower is only allowed one SLC card and the cards are not transferable. The SLC unit operates seven days per week.

(e) Postal Loans Collection

This collection caters for users who are pursuing studies under the university's distant learning programme. This is a very diverse category of users scattered all over the country. And the library extends its services to this group of users through its postal loans system. The 'cheque book' system is used in the circulation of library materials. Under this system each qualified borrower is issued with a booklet containing a fixed number of leaves (in triplicate). Materials are charged by the borrower making a request (using the cheque books) to the library by filling in details of the items they wish to borrow together with their details and mailing the top and second copy (of the cheque book leaves) to the library (the third one remains in the book). Upon receipt of the request the library dispatches, by post, the requested items which are stamped with a due date of return. The top copy of the request is retained by the library and filed in the loans file, the other copy of the request is sent together with the loaned items to the borrower. Upon the return of the materials the loan record is cancelled and the

cancelled slips are filed for statistical purposes. Overdues, overdue fines, and recalls are processed in the same way as other loans.

(f) Serials Collection

The circulation of serials is administered by the Serials and Law Collection Division (SLCD). Current issues of periodicals are housed in an open access area, arranged alphabetically by title. Back issues are housed by subject using the Library of Congress Classification system in a closed access area. There are two categories of the users of the periodical collection: those that are allowed to borrow periodicals for use outside the library, and those who are not allowed to take periodicals out of the library. The first category consists of teaching staff and other university staff on academic conditions of service and postgraduate students. The other category consists of undergraduates and other qualified users of the library.

Academic staff may borrow up to two volumes (or issues) for not more than two days. Postgraduate students are allowed to borrow one volume (or issue) for one day only.

The charging process for periodicals loaned to academic staff and postgraduate students is accomplished by the borrower filling in a preformatted slip (in duplicate) with details of the periodical(s) being borrowed: title, volume or issue number, classmark, name of borrower, department of affiliation, date of loan, and date due of return of the item(s). The loan must be authorised by the head of the SLCD who signs the loan slip. The borrowers exchange their periodicals borrower's cards with the periodicals they take out (i.e., two for academic staff and one for postgraduate students) which is attached to the copy of the loan slip. The top copy of the

loan slip is retained by the borrower as receipt of the transaction and also enables the borrower to pass through the library's security checkpoint. Upon the return of the items the loan record is crossed off and filed for statistics, and the borrower's card(s) returned to the user. Recalls and overdues are handled as under other collections discussed in preceding sections. Serials may be borrowed only during the library's normal working hours (8.30-16.45 Mondays to Fridays).

Undergraduates and other users, as pointed out above, are not allowed to take periodicals out of the library. And in a bid to protect the collection against loss and mutilation which had become endemic, since the mid 1970s this category has been barred from direct access to the periodical back issues area. However, undergraduates and other qualified users have full access to the back issues of the collection. They borrow back issues of periodicals through the serials circulations desk by providing details of the items they wish to borrow to library staff who retrieve the back issues for them. And the charging process involves the borrower filling out a preformatted periodical circulation slip with details of the item being borrowed: title, volume (or issue) number, date of publication, date of loan, their name, address, course, department and signature. They also have to surrender their SLC card (which is also used for borrowing periodicals) which is attached to the loan slip. The periodicals are loaned out for a maximum of 2½ hours (renewable) at a time. Upon the return of the item the SLC card is returned to the borrower and the loan slip is cancelled and filed for statistics. Overdues are charged per hourly basis. The serials section operates seven days per week.

(g) Special Collections

The Special Collections area is the research wing of the library. And the collections held here include the following: Zambiana materials (i.e. publications on Zambia or by Zambians on any subject); Zambian government documents, and selective documents from English speaking East, Central, and Southern African countries and British government documents on these countries; documents of international organisations including the UN and its specialised agencies, the International Labour Office (ILO) etc., and documents of regional organisations such as the Southern African Development Coordinating Conference (SADCC), the Preferential Trade Area (PTA), etc., university collection (i.e. published and unpublished items by current and past members of staff of the University and any of the departments or research institutes affiliated to the university); theses and manuscript collection including theses presented to the University of Zambia and those from other universities throughout the world by Zambians or on Zambia, and undergraduate student project reports. Other collections include rare books; audio-visual materials and equipment, map and newspaper collections.

Materials held in the Special Collections area are normally used within the confines of this area. The circulation of the collection is administered by the Special Collection Division (SCD). And access to the Special Collections area is restricted. But academic members of staff are allowed free access provided they can prove their identity. Students and other users who wish to use the collection must obtain special permission to gain access to the area. Normally students are granted a period of six weeks, and this can be renewed depending on need. Students who are granted permission to use the Special Collections area are issued with Special Collections

Identification cards which must be presented to special collections staff everytime they come to use the collection.

Some of the materials in Special Collections area such as Zambiana, university, and government documents collections are housed in the open access areas of the collection. These can be freely used by qualified users within the confines of the Special Collections area. But materials located in the Audio Visual (AV) area of the Special Collections (i.e. theses and manuscripts, including student project reports; rare books; and AV materials and equipment) are circulated using a modified ledger system, similar to the one described under the SLC above. Users who borrow materials located in the AV area have to fill in their details: name, address, and time of the loan in a preformatted loan form (which has bibliographic details of the item). In addition, the borrower has to surrender his/her identification card which is attached to the loan form for the duration of the loan. The loans are for a period of up to two hours per time (renewable). Upon the return of the item, the discharge simply involves the library assistant initialing the loan form and returning the identification card to the borrower.

Teaching staff are allowed to borrow a limited number of Special Collections materials (other than theses and other materials located in the AV area) for use outside of the library for a maximum of three days. And the loan transaction is accomplished by filling in details of borrower and the items being borrowed in a special loan slip (in duplicate) as described under Serials and Reference collections above. The loan has to be authorised by the head of the SCD who signs the loan slip.

#### 6.3.5.2 The Medical Library

The Medical Library provides reader services pertaining to normal loans of books, reference, serials and SLC for heavily used materials. The methods and procedures of circulation control employed for these materials are basically the same as those described under the Main Library above. The only point of departure with the practices of the Main Library concerns the circulation of serials. At the Medical Library the whole serials collection is located in the open access area. But loans to academic staff are treated as described under the Main Library above. Being a small library and serving a small clientele, other than reference enquiries, all other transactions are done from one circulation counter. Readers wishing to consult Special Collections materials have to travel to the Main Library.

#### 6.3.5.3 The School of Veterinary Medicine Library

No survey was made on this library but its services and operations are very similar to those of the Medical Library.

#### 6.3.5.4 The Ndola Campus Library

This library was not surveyed. But its services and operations are very similar to the Medical Library. Ndola campus readers wishing to use materials located in the Special Collections area of the Main Library can have the items borrowed on their behalf by their Campus Librarian through inter-campus loans of special collections materials.

#### 6.3.6 The Volume of Circulations

The volume of circulations presented in the tables below only cover the Library at the Lusaka Campus, excluding the School of Veterinary Medicine Library. We present the figures from the Main Library:

6.3.6.1 The Main Library

Table 4

Normal Loans 1976-85

Year	User Category				Total
	Academic Staff	Students	External Borrowers	Correspondence	
1976	14,121	86,322	2,775	-	103,218
1978	11,668	78,629	849	-	91,146
1979	11,244	82,595	1,064	-	94,903
1980+	11,244	66,586	1,047	681	79,558
1982*	13,655	68,692	1,332	271	83,950
1983	9,355	70,669	1,356	1,787	83,167
1984*	12,979	55,830	961	555	70,325
1985	12,979	77,733	930	1,552	93,194

a - Typical busy day (average) = 1700 circulations

b - Full time staff equivalent (FTE) running the issue desk = 7

Table 5

Circulation at the SLC

<u>Period</u>	<u>Circulations</u>
Weekly (Average)	6,000
Typical busy day	1,000
Typical busy hour	90

FTE Staff running SLC service = 5

+ Transfer of students from Lusaka Campus to Ndola Campus

\* University closures for 3-4 months

Special Loans

- Circulations per year (average) = 300
- Circulations per month = 25
- FTE staff running special loans = 1

Postal Loans

- Circulations per year (average) = 1200
- Circulations per month (average) = 100
- FTE staff running postal loans = 1

Inter-Library Loans

- Loans per year (average) = 1500
- Loans per month (average) = 100
- FTE staff running ILL service = 2\*

Serials Division

Table 6

Serials Circulations 1979-1985

	1979	1980	1981	1982	1983	1984	1985
Undergraduates	-	5,125	5,049	4,178	4,910	4,246	8,680
Academic staff/ Postgraduates	-	737	2,668	1,923	2,007	-	-
Academic staff	-	-	-	-	-	1,774	1,044
Postgraduates	-	-	-	-	-	820	681
Totals	6,625	5,862	7,717	6,101	6,917	6,840	10,405

- Typical busy day (Undergraduates) = 103 loans
- Typical busy hour = 7-10 loans

\* Staff also provide the Library's user information services

## Special Collections Division

### (a) Theses/Student Projects 1979-1985

- Average circulations per year = 1,274
- Average circulations per day = 40
- Circulations per typical busy hour = 15
- FTE staff running circulations = 2.5

### (b) Special Loans 1981-1985

- Average circulations per year = 712 loans
- Average circulations per week = 14 loans
- Average circulation per day  
(Monday-Friday) = 3 loans

#### 6.3.6.2 Other Libraries

No circulation statistics were available from the Medical Library. And libraries at the School of Veterinary Medicine and Ndola Campus were not surveyed.

#### 6.3.7 The Circulation Control Systems

The UNZA Library has defined the objectives of its circulation control systems as serving the following functions:

1. to identify materials charged out of the library;
2. to identify the borrower (i.e., name, address, and borrower number);
3. to secure the return of library materials if they are not returned within a specified period;
4. to enable the library staff to obtain statistics on the materials charged out;
5. to facilitate the reservation of materials which are on loan, and;
6. to identify delinquent borrowers.

As pointed out elsewhere in the Chapter various types of circulation control systems are employed by the library depending on the location

and type of materials. Thus, we find from the preceding sections: the 'ledger' system being used for the circulation of SLC and special collections materials; the 'slip' system being used for lending out serials, making special loans for reference and special collections materials, and for keeping track of ILL transactions, and; the 'cheque book' system being used for postal loans.

But the main circulation control system in current use for lending out normal loan materials, is the Browne System. The basic operations of the system for charging, discharging, placing reservations, recalls, etc., are as described in Chapter 3 (section 3.2.2). The library identified the same advantages of the Browne system as those discussed under section 3.2.2 above, and these additional ones:

- ability to identify the different user categories (because borrower's pockets are colour coded according to the user category);
- easy to locate loan records under 'date due', and;
- the returning of borrowers' pockets to the reader when they return library items as a receipt to the borrower signifying the return of library items.

The Library also faces the same weaknesses of the system outlined in section 3.2.2, and additionally:

- that the borrowers pockets wear out very easily and need constant replacing;
- to operate effectively, the system requires more than one library assistant at the issue desk because two queues have to be served: one for issuing and the other for returning library items, and;
- problems of identifying items loaned to a given borrower, because loans are filed by date and within the date sequence by author (or title).

The Library changed to the Browne System in 1979 because it had become very difficult to operate the Dickman-based charging system which had hitherto been in use due to administrative and technical problems. Administratively, the library found it difficult to enforce borrowing limits because, then, borrowers used an embossed plastic card (which contained the borrower's name, address, and number). And, although on paper each category of borrowers was restricted to borrow up to a certain limit, in effect, they borrowed as much as they wanted because the library had no way of trapping overborrowers at the issue desk at the time the materials were being charged or discharged.

On the technical side, the library found itself stranded with an obsolete system. The issue pockets (used for filing loan slips) and the borrowers plastic cards used in the charging process were no longer available from the overseas-based manufacturers, and they could not be obtained locally either. Further, the library could not find spare parts for its old imprinters from its overseas suppliers because the former had new and more expensive models on the market. The only viable alternatives open to the library then were either to purchase the new model imprinters or to change to another circulation system. Purchasing the new imprinters would have had huge financial implications. And so it was decided to change to the cheaper Browne System.

#### 6.3.8 Problems of the Current Manual-based Circulation Control Systems

The problems of manual-based circulation control systems have been summarised in Chapter Three as essentially centering on their inability to:

1. readily yield information about exceptional conditions; e.g. sudden increases in volumes of circulations;
2. provide for convenient and easy collection and processing of statistical data;
3. provide for facile production of notices and reports, and;
4. permit fast manipulation of data nor duplication of data.

UNZA Library's circulation control system suffer from all these basic weaknesses. In addition to these, the following specific problems are a common feature of the library's circulation system:

1. Inefficient system;
2. Labour intensive, and;
3. Provides little management information.

#### 1. Inefficient System

While the Browne System is extremely fast for charging items, it is extremely slow when it comes to discharging. Because of the slow discharging process queues easily form at the circulation desk at peak period especially at the end of term. It is not uncommon during these periods to see long queues of students and users waiting to return library items. Making reservations, renewals, recalls, or checking the current status of library items on loan is a very cumbersome and time consuming process requiring library staff to manually check through the whole circulations file holding thousands of records.

#### 2. Labour Intensive System

The current system is very labour intensive and therefore very costly to maintain. An examination of just the two high activity areas at the Main Library (i.e., the issue desk and the SLC) shows that no

less than twelve full-time staff are required to run these stations. In view of the repetitive nature of the routines and processes of circulation control, a considerable amount of staff-time is spent on doing tasks which can be best handled by a machine.

### 3. Inadequate Management Information from the System

Due to its limited scope in design, the system provides very little management data on collection usage. Other than providing information on collection usage by categories of users, the system does not provide information on the usage of the actual collection. It does not, for instance, provide information on which elements of the collection are being utilised (or underutilised). And even the little data it provides is collected at great expense in staff time because the transactions have to be physically counted at the end of each day. Accurate management information, as pointed out elsewhere in this study, is a very important requirement for providing an efficient circulation control service. It is on the basis of management information that the real needs of the users can be gauged and services be improved or expanded to meet their needs.

All these problems seem to revolve around one central issue: poor record keeping. It is because of poor record keeping that discharging issues, making reservations, recalls, renewing materials etc. take such a long time to process, which often results in queues forming at the issue and SLC desks. The inadequate management information provided by the system is a result of the system's poor record creation, collection, and maintenance process. It was for these reasons that the report on the 1983 Library Stock-taking exercise which had observed a generally poor record in all of the library's operations, proposed in one of its recommendations that

computerisation of the library's operations would be, perhaps, the ultimate solution to its record creation problems.

### 6.3.9 Justification for the Automation of the UNZA Library

In Chapter 1 (1.4) we identified five reasons upon which the case for automation of library process can be made. And they include the following:

1. that automation results in improvements to reader services;
2. automation leads to a better management of library resources;
3. automation reduces the increasing rate of library operational costs;
4. automation is a pre-requisite for participation in co-operative ventures, and crucially;
5. that automation was increasingly becoming a pre-requisite for accessing current information which is increasingly becoming available only in electronic form.

In addition to these reasons (which are discussed in detail in section 1.4), automation of the UNZA library's circulation control system is justified on the following grounds:

1. Increased scope of operations
2. Labour intensiveness of the current system.

#### 1. Increased scope of operations

The sheer volume of circulations handled by the library is very heavy. An examination of just the two high activity areas of the Main Library (issue desk and SLC) shows that between them they circulate no less than 2,000 items per day. And taking just the time that the university is open, the SLC alone circulates an average of about 216,000 (6000 x 36 (36 weeks per academic year x 6,000 weekly circulations)) items per academic year. The main circulations desk

circulates a further 100,000 items per year, giving a total of over 300,000 items per year for these two stations alone. Given the repetitive nature of the routines and processes of circulation control, the actual scope of activity performed by circulations staff involves millions of repetitive steps which can be performed more efficiently by the computer.

The library's scope of operations is likely to continue to grow for the foreseeable future. This is in the light of the fact that as the only institution of higher learning in the country, the University will continue to grow and so will the demands placed on the services of the library. Further, as the nation's largest and best stocked library, the pressures for library resources from the general public will continue to be exerted on the library. The demands from the general public become more apparent when viewed from the fact that public library service in the country is generally poor. In order for the library to effectively discharge its responsibilities to its parent institution and fulfill the requirements of its status as the nation's National Reference Library, it needs a system which is versatile enough to cope with increased volume of activity and also aid the library in the general management of the collection. The computer offers all these capabilities.

## 2. Labour Intensiveness of the System

As noted in section 6.3.8, the current circulation systems are very labour intensive. And staff spend most of their time doing repetitive routines which can be better performed by the computer. A computer-based system would, for instance, cut down on staff requirements for the two high activity areas at the Main Library

(issue desk and SLC) to about two each, and other staff could be better utilised in other areas of the library.

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## CHAPTER SEVEN

### ENVIRONMENT OF THE AUTOMATION OF THE UNZA LIBRARY CIRCULATION CONTROL SYSTEM

#### 7.0 Introduction

In this chapter we present a brief review of the environment of the automation of circulation control of the UNZA Library from a national, institutional and organisational perspective.

#### 7.1 Use of Computers in Zambia

Use of computers in Zambia is not a new phenomenon. As early as 1970, Mwene and Emenalo noted in their excellent study report entitled, "Computer-mania in Zambia",<sup>1</sup> that by the early 1970s computer usage in Zambia had become fairly widespread. What is most striking from this study is that most of the organisations using computers then were using them mostly for accounting purposes (payroll, stock control, etc.), therefore greatly underutilising the machines on which they spent vast sums of money to purchase and/or maintain. They concluded from their study that computerisation in Zambia, except for a few cases, was undertaken merely for prestigious purposes. Hence, the title of their study report!

Both IBM and ICL have maintained local offices in Zambia since the 1960s when computer usage was taking root in the country. A few other computer companies such as Burroughs have also been providing computing services in the country for sometime now.

The major users of computers in Zambia have been central government, especially the ministry of finance; local governments; the mining companies; parastatal organisations and other statutory boards; the Railways corporation; computer bureaux; banks; and the University of Zambia. And with the introduction of microcomputers, individuals and smaller businesses are adopting computer technology.

### 7.2 The University of Zambia

The University has been using computers almost since its inception. Uses have mainly been for scientific research by staff and students; for administrative and accounting purposes (payrolling and financial records), and; educational purposes - processing examination results of both primary and secondary schools, and the University's own students. As of 1985, the University had concluded negotiations on the purchase of a new IBM 4300 series computer to be installed in late 1986. Once installed the new facility will see the extension of computer usage to most of the units of the University, including the University Library.

### 7.3 Computer-based Libraries in Zambia

As of 1985, we were not aware of any library that was using (or had used) computers in its day-to-day operations in Zambia. But there has not been a shortage of ideas about using computers in Zambian libraries. In 1979 Lungu<sup>2</sup> proposed the formation of a computer-based library co-operative for research libraries in Zambia. According to Lungu, the formation of a computer-based cooperative would greatly facilitate the sharing of resources between libraries in the country.

Lundu, making his contribution to the debate on the use of technology in Zambian libraries, rightly cautioned against the wholesale

adoption of computer technology. He argued that most of the libraries in Zambia could not afford to run a computer-based system because they had neither the technical expertise nor the financial resources required to run such systems. He further argued that only libraries with large collections, a sophisticated user community, financial and technical resources, and a sound organisational backing, should contemplate computerisation. Basing his analysis of the Zambian library scene on this criterion, he concluded that only the UNZA Library met all these conditions in the country at the time.<sup>3</sup> Of course, when Lundu made these observations over half a decade ago, the microcomputer was just making its way onto the computer arena and its potential for library application was an unknown quantity. But even with the development of the cheap and versatile microcomputer systems of the 1980s, Lundu's analysis of the Zambian library scene vis-a-vis computerisation, is still very much relevant to present day Zambia. Automation is still not a practical proposition for most libraries in Zambia, mainly due to the generally poor state of library development in the country.

#### **7.4 Use of Computers in UNZA Libraries**

To date, none of the UNZA libraries have used computers on a regular basis in their day-to-day operations. But in 1983, the library had an excellent opportunity to convert all its bibliographic records to machine readable form when the University's Senate Finance Committee requested the library to conduct a stock-taking exercise to determine the cash value (for insurance purposes) of all its holdings. The exercise also required that the record of each library item be keyed into the computer to facilitate the calculations of the cash value and holdings of the library. But for a number of reasons, the

library failed to take advantage of this opportunity because due to the poor design of the data input form (which was designed by the University's Computer Centre on the basis of the information supplied by the library), resulting in the squeezing of each record of a library item into one line of 80 characters. Such item details as classmark, author, title, year of publication, number of copies, and unit price (of the item) were squeezed into one 80 character line. The result of this was that most of the authors and titles had to be truncated (sometimes the truncations were so bad that it was difficult to identify the items properly) because they could not fit into their assigned fixed fields. Further, other bibliographic details, critical for proper identification of library items, such as, accession number, ISBN, ISSN, publisher, place of publication, etc. were left out altogether. As a result of this the records that were finally created in machine readable form had very little use for library purposes.<sup>4</sup> Nevertheless plans for the automation of certain processes of the UNZA library have always been in the minds of UNZA librarians.

In 1975, Mwacalimba<sup>5</sup> made an excellent proposal to design a serials listing system using a computer. Although the proposal was well received by the then library administration, it was never implemented. In 1982 the then Lusaka Campus Librarian, Mr. D.O. Bampoe presented his proposals for discussion (by staff) on the computerisation of the main public catalogue as a way of improving the chaotic mess of the library's public card-based catalogue.<sup>6</sup> The proposed system was to be based on the recommendations of the second edition of the Anglo-American Cataloguing Rules (AACR2). And in 1985 the library formed a Committee to consider how the library would adopt the AACR2 code, as a step towards preparing the library for the

international format of machine readable cataloguing records.<sup>7</sup> The AACR2 Committee has since produced a cataloguing manual which is to be the basis of the library's adoption of the AACR2 code.

In September of 1985 the implementation of AACR2 in the library was debated on by professional staff on the basis of the manual prepared by the AACR2 Committee. And one of the issues examined by this meeting was how the library would handle catalogue records produced under the AACR2 code: whether to interfile the catalogue cards produced under AACR2 with the old catalogue or to close the old catalogue and open a new one for the AACR2 records. One of the solutions proposed over the problem of dealing with interfiling new and old cataloguing records, was to postpone the implementation of AACR2 until the library computerised its operations because new cataloguing information could be held on-line in machine readable form for public access.<sup>8,9</sup>

And in 1986, in preparation for the automation of the library, a Library Computer Committee was formed. The basic terms of reference of the Committee were defined as follows:<sup>10</sup>

1. to study in detail the nature and potential of the new [computer] systems to be recommended;
2. to identify and elaborate on the processes to be affected [by automation];
3. to determine the library's areas of priority from time to time;
4. to prepare a feasibility study that should focus on the costs and benefits of any number of approaches;
5. to determine whether to acquire software packages, develop inhouse, use mainframe computer or mini/micro computers;
6. to act as a link between the University Library and other University Computer Committees;

7. to act as an advisory body to the University Library in so far as matters pertaining to computerisation of the Library operations are concerned, and;
8. to take responsibility of any other considerations or matters pertaining to computerisation of the library operations.

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## CHAPTER EIGHT

### THE PROPOSED UNZA CIRC SYSTEM

#### 8.1 Introduction

From the discussions in the preceding two chapters, it is evident that the UNZA Library requires a technology that will help it to:

- solve its current operational problems;
- expand its services, and;
- prepare for future expansions.

It has been suggested in chapter six (6.3.9) that the computer offers all these capabilities. The question for the library, therefore, is not whether but how it should computerise. It is to this question that this chapter is addressed. Perhaps it should be stated from the outset, that the system being proposed should be seen in the light of the library's wider plans to automate aspects of its operations including cataloguing, acquisitions, serials control, and public information systems. Further, what we are presenting in these proposals is a general outline of the configuration of the proposed system. To design a detailed system with all the elements discussed in chapter five would require a detailed systems study of the current operations of the library, which was clearly outside the domain of this study.

## 8.2 Objectives of the Proposed System

One of the essential requirements of an automation programme is a clear definition of the objectives of the desired system. Among other things, objectives help system implementors in evaluating the system. It is on the basis of its set objectives that a system can be judged as to whether it is meeting the tasks it was set out to do or not. For our purposes, the University of Zambia Circulation Control System (UNZA CIRC) will have the following general objectives:

1. to facilitate the execution of all the routines of circulation control: charging, discharging, renewing, recalling, reserving, notice production, user registration, etc.;
2. to facilitate intercampus library loans through an electronic mail and messaging system;
3. to facilitate the public enquiry system on the current status of library materials;
4. to provide management information on the use of the collection;
5. to facilitate user access to on-line databases, and;
6. to provide interfaces with other library subsystems: cataloguing, acquisition and ordering, and serials control.

## 8.3 The System

Although the UNZA Library is one of the projected users of the University's new IBM 4300 series computer due for installation in late 1986, it is our considered opinion that the library should acquire a stand-alone turnkey integrated system. Shared systems, as we have seen in discussions in chapter one, have problems of control over the use of the computer, low priority rating during periods of high demand on CPU time by competing departments etc. In fact the library experienced some aspects of being given a low priority user

rating by the computer centre during the keying into the computer of its stocktaking exercise data. It took the computer centre almost two years to process library data (about 110,000 80-character records) while much larger jobs such as primary and secondary school examination results were done in a matter of weeks. In such an environment, the library will be unable to operate its services to their full potential, thereby defeating the very essence of automation. Further, the demands for processing of library routines, as the proposed system will reveal, will be too great for the new IBM system which is also expected to provide computing services to the rest of the university.

In view of the trends in library automation towards distributed integrated systems, the UNZA CIRC system being proposed is a turnkey stand-alone integrated mini and microcomputer-based system. Initially it will have three major components:

1. the Lusaka Campus Library System (UNZA CIRCLU);
2. the Ndola Campus Library System (UNZA CIRCND), and;
3. the Solwezi Campus Library System (UNZA CIRCZO).

All the three systems will be linked together in a University of Zambia Library Network (UNZA-NET) via telecommunications equipment and lines. The UNZA-NET, which might form the nucleus of a future national network of academic libraries (including college and polytechnic libraries) in Zambia, will have linkages with other local, national, regional and international networks via telecommunications lines (see figure in 8.4).

### 8.3.1 The UNZA CIRCLU

The UNZA CIRCLU will constitute the core of the system. It will be run on a minicomputer system located in the Main Library. In

addition to holding the records of the libraries of the Lusaka Campus, it will also hold the records of the other two campus libraries at Ndola and Solwezi, plus the records of libraries of constituent institutions that may be formed in future - in an UNZA Libraries Union Catalogue, to be known as the UNZA DATABASE. The UNZA DATABASE will be accessible on-line to all the participating university libraries through the UNZA-NET.

The UNZA CIRCLU will provide circulation services to the following libraries:

1. The Main Library;
2. The Medical Library;
3. School of Veterinary Medicine Library;
4. The Documentation Centre at the 'Munali Campus' serving the research bureaux located there: the Institute of African Studies, the Rural Development Studies Bureau, and the Institute of Human Relations, and;
5. Other branch libraries of the Lusaka Campus that may be set up in the future.

Other than the Main Library, the branch libraries will be connected with the minicomputer located at the Main Library via terminals located at branch libraries via telecommunications lines.

### 8.3.2 UNZA CIRCENDO

The UNZA CIRCENDO, due to its relatively small size in terms of both the collection, user community and volume of circulations, will be microcomputer-based. And it will provide the usual circulation control services to the library. It will be linked to the main system at Lusaka via telecommunications lines for access to the UNZA DATABASE, intercampus loans etc.

### 8.3.3 UNZA CIRCISO

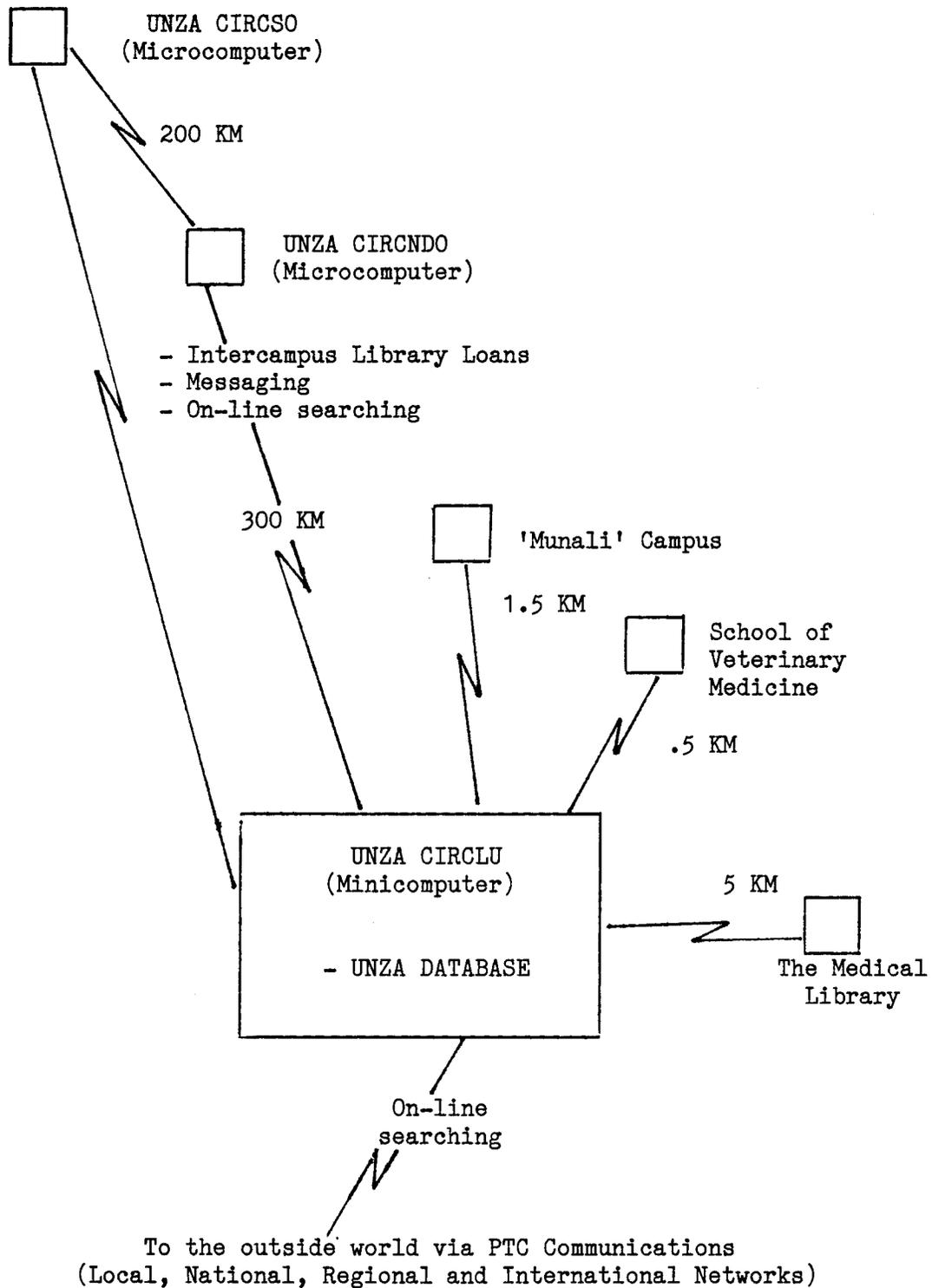
When the Solwezi Campus is developed, its system, like the Ndola Campus, will be microcomputer-based. It will also have linkages with the main system at Lusaka via telecommunications lines.

### 8.4 Outline of the Proposed System

Figure 13 on the next page gives a graphic outline of the proposed UNZA CIRC system:

Figure 13

The UNZA CIRC System



KEY

— = Telecommunications link

□ = Network node

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APPENDIX

RESEARCH QUESTIONNAIRE TO THE  
UNIVERSITY OF ZAMBIA LIBRARY

1. Statistics and Related Documents\*

1.1 Readers Services Division

(A) Statistics for the following areas:

- (i) Open shelves (normal loans) 1966-1985, annual statistics (or what is available) plus:
  - (a) For a typical busy day (average) \_\_\_\_\_
  - (b) Number of full-time equivalent (FTE) staff running circulations \_\_\_\_\_ (FTE staff)
- (ii) Short Loans Collection:
  - (a) Weekly circulation statistics (average) \_\_\_\_\_
  - (b) Circulations for a typical busy day (average) \_\_\_\_\_
  - (c) Circulations for a typical busy hour (average) \_\_\_\_\_
  - (d) Number of FTE staff manning short loans circulations \_\_\_\_\_
- (iii) Special Loans:
  - (a) Circulations per year (average) \_\_\_\_\_
  - (b) Circulations per month \_\_\_\_\_
  - (c) Number of FTE staff manning special loans \_\_\_\_\_
- (iv) Postal Loans:
  - (a) Circulations per year (average) \_\_\_\_\_
  - (b) Circulations per month (average) \_\_\_\_\_
  - (c) Number of FTE staff manning postal loans circulations \_\_\_\_\_
- (v) Inter-Library Loans:
  - (a) Loans per year (average) \_\_\_\_\_
  - (b) Loans per month (average) \_\_\_\_\_ State loan period \_\_\_\_\_
  - (c) Number of FTE staff manning the ILL service \_\_\_\_\_
- (vi) Other units not listed above (please list on a separate sheet as under i-v above)

(B) Forms:

Please attach samples of the following documents or forms:

- (a) Membership application form(s) for all categories of users
- (b) Special loans form(s)
- (c) Record of loan transaction (normal circulations) -- describe what it contains (e.g. borrower's pocket(s) and book slip) \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- (d) User borrower tickets (blank forms) for each category of user

(C) Membership:

- (a) Please list all categories of borrowers and their borrowing rights as follows:

\* The same questionnaire was also sent to the Medical Library as 1.4

Type	No. of tickets (maximum allowed)	Loan period
1. Academic	-----	-----
2. Students	-----	-----
3. External	-----	-----
4. Non Academic	-----	-----
5. Institutional	-----	-----
6. Correspondence	-----	-----
7. Departmental	-----	-----
8.	-----	-----
9.	-----	-----
10.	-----	-----
11.	-----	-----
12.	-----	-----

(b) Please indicate the length in characters (letters and punctuation marks) of the longest known name (surname and initials) of personal members. \_\_\_\_\_ (characters long).

(D) Overdues/Recalls:

- (a) Please attach sample(s) of overdue notice(s) used for the various types of loans.
- (b) Please attach sample(s) of notice(s) used for recalling loaned materials

(E) Book Record:

Please indicate by checking (X) the fields contained on the book slip:

- (a) Author \_\_\_\_\_
- (b) Title \_\_\_\_\_
- (c) Accession no. \_\_\_\_\_
- (d) ISBN/ISSN \_\_\_\_\_
- (e) Classmark \_\_\_\_\_
- (f) Other - please specify \_\_\_\_\_

(F) Reservations:

Please attach the following documents:

- (a) Reservation request form(s)
- (b) Reservation notification (note) sent to the requester(s) informing them that the reserved item are ready for collection

END

1. Statistics and Related Documents

1.2 Serials and Law Collection Division

(A) Statistics (from earliest period-1985)plus:

(i) Internal Circulations (undergraduates):

- (a) Typical busy day \_\_\_\_\_ (loans)
- (b) Typical busy hour \_\_\_\_\_ (loans)

(ii) External loans (1 day, 3 day, etc) average:

- (a) 1 day \_\_\_\_\_ (loans per day)
- (b) 3 day \_\_\_\_\_ (loans per day)

(iii) How many days per week is the Division open for users:  
Open \_\_\_\_\_ days per week

(iv) How many full-time equivalent (FTE) staff are manning the  
circulations of serials: \_\_\_\_\_ FTE staff

(B) Forms

Please attach samples of the following documents used:

- (a) Internal loans (i.e., hourly loans to undergraduates)
- (b) External loans (i.e., 1 day, 3 day etc. loans).

(C) Overdues

Please attach samples of the following documents (or what is available):

- (a) Overdue notice(s) for periodicals on loan
- (b) Recall notice(s) for periodicals on loan

END

1. Statistics and Related Documents

1.3 Special Collections Division

(A) Statistics (earliest period-1985) plus the following:

(i) Theses:

- (a) Theses per year (average) \_\_\_\_\_
- (b) Theses per typical busy day \_\_\_\_\_
- (c) Theses per typical busy hour \_\_\_\_\_
- (d) Loan period for theses \_\_\_\_\_ (hours per time)

(ii) Students Projects:

- (a) Students projects per year (average) \_\_\_\_\_
- (b) Students projects per typical busy day \_\_\_\_\_
- (c) Students projects per typical busy hour \_\_\_\_\_
- (d) Loan period for students projects \_\_\_\_\_

(iii) Other materials in the A/V room: please specify as in  
(i) and (ii) above on a separate sheet

(iv) Special Loans:

- (a) Per year (average) \_\_\_\_\_
- (b) Per week (average) \_\_\_\_\_
- (c) Per day (average) \_\_\_\_\_

(B) Forms:

Please attach samples of the following:

- (a) Form(s) used for theses circulations
- (b) Form(s) used for students projects circulations
- (c) Form(s) used for other materials in A/V room circulations
- (d) Form(s) used for special loans
- (e) Please describe below what the record of the loan transaction contains for the following materials:
  - (1) Materials in the A/V room (i-iii above) e.g., borrower's I.D. plus form(SO used for theses circulations \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

(2) Special loans \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

(C) Overdues:

- (a) please attach sample(s) of notice(s) used for recalling overdue special loan materials

END

1. Statistics and Related Documents

1.4 Medical Library - Periodicals circulations (A-F as in 1.1)

(A) Statistics (from earliest period-1985) plus:

(i) Internal Circulations (undergraduates):

- (a) Typical busy day \_\_\_\_\_ (loans)
- (b) Typical busy hour \_\_\_\_\_ (loans)

(ii) External loans (1 day, 3 day, etc) average:

- (a) 1 day \_\_\_\_\_ (loans per day)
- (b) 3 day \_\_\_\_\_ (loans per day)

(iii) How many days per week is the Division open for users:  
Open \_\_\_\_\_ days per week

(iv) How many full-time equivalent (FTE) staff are manning the  
circulations of serials: \_\_\_\_\_ FTE staff

(B) Forms

Please attach samples of the following documents used:

- (a) Internal loans (i.e., hourly loans to undergraduates)
- (b) External loans (i.e., 1 day, 3 day etc. loans).

(C) Overdues

Please attach samples of the following documents (or what is available):

- (a) Overdue notice(s) for periodicals on loan
- (b) Recall notice(s) for periodicals on loan

END

## 2. Documents, Books, Studies:

### 2.1 Library Documents

Kindly supply copies of the following documents:

1. Library rules
2. Serials loan policy
3. Special collections loan policy
4. Preliminary 1983 stock-taking report
5. Computer Committee minutes on automation in the university Library
6. Dr. H. Mwacalimba's proposal for the automation of the Serials Division(ca.1977)
7. Mr. Bampoe's proposals for the automation of the library catalogue(ca; 1981/1982)
8. AACR2 terms of reference -- if they mention possible computerisation of cataloguing operations
9. Any other documents on computerisation in the UNZA library

### 2.2 Books

1. Mweene, B.F.(and associate), Computer Mania in Zambia(ca 1973?)  
- in the Special Collections. Iam mostly interested in sections dealing on the use of computers in Zambia( especially at UNZA); computer population in Zambia; and conclusions. If it will not be possible to send the book here please include full bibliographic citation in the sections that will be sent here.
2. Any other books on computers in Zambia that may be in the library

### 2.3 Studies

School of Engineering, Department of Electronics.

In 1984 or 1985 the department of electronics carried out a survey of the use of computers in Zambia, similar to Prof. Mweene's above. I wonder whether a report has been issued on the same.

- 2.4 Any document(s) issued by the Computer Centre (UNZA) about the services it provides in the university.

END

### 3.0 UNZA Library Circulation Systems.

The purpose of this questionnaire is to provide a historical background to the library's circulation system. Kindly answer the following questions as fully as possible.

1. Briefly describe the various circulation systems (for normal circulations only) that have been used at UNZA Library before changing to the current Browne system.
2. When was the change to the Browne system made?
3. Why was the change to the Browne system made?
4. What problems do you see with the current (Browne) system?
5. Any comments you might have on the above will be appreciated

END