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An evaluation of the functionality, usability and MARC support requirements of the catalog module of the Columbia Library System

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Department of Information and Library Studies

An Evaluation of the Functionality, Usability and 'MARC' Support Requirements of the Catalog Module of the Columbia Library System

by

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*A dissertation submitted in partial fulfilment of
the requirements for the award of the Master of
Science degree of Loughborough University of
Technology*

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Dedicated to my children, Eva and Martin.

ABSTRACT

The study aims to evaluate the functionality, usability and MARC support of the Catalog Module of the Columbia Library System version 2.08 in the context of the cataloguing automation needs of the National Agricultural Library in Uganda. The System is produced by Columbia Computing Services in Canada. The investigation is conducted in a simulated library environment using live data of the Agricultural Library, on an IBM PS/2 and MS DOS 4.1. Rush methodology of checklist is used to evaluate 38 functional requirements and MARC support while that of Ravden & Johnson is adapted for usability features. Each feature in all the checklists is scored against a scale of -1 to 10. Subsequently a cumulative score for the CLS designated as 'S2' and the ideal system as 'S1' is worked out. From these scores a performance ratio for functionality, usability and critical functions is calculated. Then each performance ratio is compared against the arbitrary score of 0.6 (Rush 1985, p.124). The findings indicate that the overall system performance ratio of (0.73) is well above the arbitrary level. The functionality scored (0.70), critical functions (0.77) and usability (0.73). The analysis of MARC interface showed that it supports all the essential and critical cataloguing data elements. It is against this background that the Researcher states with confidence that the system can effectively meet the cataloguing automation needs of the National Agricultural Library in Uganda. The study has also produced an empirical basis for conducting an objective evaluation of other online catalogues.

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ABBREVIATIONS

AACR2	- Anglo-American Cataloguing Rules 2nd. edition
ANSI Z 39.2	- American National Standard for Bibliographic Information Interchange
AUSMARC	- Australian national MARC format
BSL	- BLCMP Library Services Ltd.
CLS	- Columbia Library System
DDC	- Dewey Decimal Classification
ISBD	- International Standard Bibliographic Description
ISO 2709	- International Standard Organization Format for Bibliographic Information Interchange
LAN	- Local Area Network
LCMARC	- Library of Congress MARC format
LCC	- Library of Congress Classification
LCSH	- Library of Congress Subject Headings
LCSH-rm	- Library of Congress Subject Headings Authority File in Machine Readable Format
MALMARC	- Malaysian national MARC format
MARC	- MACHine Readable Cataloguing
OCLC	- Online Computer Library Centre, Inc.
RLIN	- Research Libraries Information Network
SCOLAP	- Scottish Libraries Co-operative Automation
SLS	- SWALCAP Library Services
UDC	- Universal Decimal Classification
UIC	- UTLAS International Canada
UKMARC	- United Kingdom national MARC format
UNIMARC	- Universal or International MARC format
USMARC	- United States national MARC format
WLN	- Western Library Network
OKAPI	- Online Keyword Access to Public Information
FAO	- Food and Agriculture Organization of the United Nations.
UNESCO	- United Nations Educational Scientific and Culture Organization.

(Main source: Gredley 1990, pp. 293-309)

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Esther B. Lwanga.

CHAPTER 1

BACKGROUND TO THE NATIONAL AGRICULTURAL LIBRARY AND DOCUMENTATION CENTRE IN UGANDA

1.1 Introduction

Library automation in developing countries is still in its infancy even now in the 1990s. However, several studies indicate that some of them appreciate the benefits of automating the library operations. Tedd (1984) discusses some of the potential problems of implementing a computer-based library system. Virtually all these problems are still great constraints to developing countries as (Agha 1986 ; Udoh and Aderbigbe 1987 ; Chipunza 1989 ; Chijioke 1989 ; Robertson 1989 ; Msuya 1990 ; Enyia 1991 ; Adeniran 1992) indicate in their studies.

1.2 Prospects and Constraints of the National Agricultural Library and Documentation Centre in Uganda.

a. Historic Development

The Ministry of Agriculture in Uganda in collaboration with Food and Agriculture Organisation of the United Nations (FAO) established the National Agricultural Library and Documentation Centre in 1989. This was the first step toward the establishment of a national agricultural information system for the agricultural research sector. Parker (1989) and Uganda Working Group 9A (1991) outline the objectives of the centre. These are:

- ensure collection development and provision of effective library services.
- consolidate all national documents relating to agriculture, forestry, livestock, fisheries and the related fields.

- create a computerised national database for the national documents for easy access and eventual production of the national agricultural bibliography.
- create an index for the on-going research to promote access to completed and on-going research to reduce duplication of research efforts and to save on the scarce resources.
- set up Union List for serial holdings of the six branch libraries and Makerere University Library, Africana section.

The Ministry attaches much importance to the national documents especially the unpublished ones because they form a potential source of useful information essential for research. Kaniki (1992) supports this view in his argument that unpublished reports often contain current and detailed information which is not available elsewhere and yet agricultural researchers often need it for background information to their research work.

b. Organisational Structure

Following the recent restructuring of the Ministries of Agriculture and Environment Protection an autonomous National Agricultural Research Organisation (NARO) was created. Its objective is to under take, promote and streamline research in agriculture, livestock, fisheries and forestry (Uganda Working Group 9A, 1991). The library is one of the Support Service Units of the Organisation, under the office of Deputy Director General. It has six branches libraries located at the respective Research Institutions. These are:

- Kawanda Agricultural Research Institute (KARI)
- Namulonge Agricultural and Animal Production Research Institute (NAARI).
- Serere Agricultural and Animal Production Research Institute (SAARI).

- Forestry Research Institute (FORI), Kifu.
- Livestock Health Research Institute (LIRI), Tororo.
- Fisheries Research Institute (FIRI), Jinja.

It has two professional librarians, two information officers and four support staff. Each branch library has one position for the professional and one support staff.

c. The Library Unit

The library is still maintaining the manual catalogue of divided type. It uses the Universal Decimal Classification (UDC), Anglo-American Cataloguing Rules second edition (AACR2) and Sears List of Subject Headings for descriptive and subject cataloguing. The number of catalogue cards is limited to six to control the size of the catalogue. Collection development has been a big constraint until recent restructuring. It is given high priority especially the acquisition of serials to ensure that the research scientists keep abreast with current research developments.

d. Documentation Unit

The Documentation Unit is charged with the responsibility of centralising all the national documents relating to agriculture. To achieve this it collects documents that are kept in offices or by individuals which are not readily available. It participates in the cooperative database, the Agricultural Information System for Science and Technology (AGRIS) of Food and Agriculture Organisation of the United Nations (FAO). It has automated the database on the MICRO CDS/ISIS software of the United Nations Educational Scientific and Cultural Organisation (UNESCO). For indexing it uses the FAO thesaurus, the AGROVOC. The Unit intends to produce the National Agricultural Bibliography in the near future. It has access to the AGRIS CD ROM database which gives it the opportunity to access documents

indexed by all participating countries.

In addition the Unit indexes on-going research under the Current Agricultural Research Information System database (CARIS), of FAO, on the MICRO CDS/ISIS.

1.3 The Objectives of the Study

The objectives are:

- a. To establish whether the Catalog Module of the Columbia Library System has got the *functional requirements* of a typical second generation micro-computer based cataloguing system. If so is it suitable for the user needs of the National Agricultural Library in Uganda?
- b. Investigate whether it has the *usability* requirements of a *user-friendly* catalogue interface.
- c. Establish its capability for *MARC support* for cataloguing data elements.
- d. Establish the implications of the study on evaluation of other automated library systems.

1.4 Assumption of the Study

The assumption is that the evaluation of the Catalog Module of the Colombia Library System is to establish if it can meet the user needs of the National Agricultural Library and Documentation Centre in Uganda.

1.5 Limitations of the Study

The study is conducted in experimental environment which is an impediment on evaluation of some of the functional and usability requirements, such as system resilience under load.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

The study aims to provide pertinent literature review to enrich the research strategy. The review will in particular address six areas. These are : (1) Library Automation (2) Online Catalogues (3) Enhancing Subject Access in Online Catalogues (4) Authority Control in Online Catalogues (5) Ergonomics and Usability of Online Catalogues (6) Evaluation Methods for Microcomputer-based software.

2.2 Library Automation

The study will examine the trend of library automation in developed and developing countries. Reynolds (1985) ; Tedd (1987) provide a review of the historical development of library automation in the 1950s in the UK and US. They describe the development of MARC format in 1965-6, co-operatives in 1970s with subsequent cataloguing services, BLCMP Library Services Ltd. (BLS), SWALCAP Library Services (SLS) and Scottish Libraries Co-operative Automation (SCOLCAP) in UK and Online Computer Library Centre (OCLC), UTLAS International Canada (UIC), Research Libraries Information network (RLIN) and Western Library network (WLN) in the US. Crawford (1984, p.1) states that the creation of MARC was the cornerstone in the evolution of library automation and Tedd (1987) adds that the appearance of microcomputers in the 1980s gave it another turn. She also discusses the development of library based systems. She and Hawks (1988) underscore the role of microcomputers for the technical library operations and

management. Gritein and Yarmish (1990) emphasises that the advent of computer technology has revolutionised library functions at all levels.

Larsen (1992) gives an overview of the library automation market in the 12 European Community countries. He lists the top 20, small system software for small libraries and Columbia Library System (formerly known as OCELOT) is among them. He expressed scepticism over the market trends which may influence the market place and in particular market saturation and shrinking library resources which may hinder system enhancements. Detailed market surveys of UK and US from 1988 to 1990 regarding market trends, research and development are discussed by (Matthews 1985a ; Blunden-Ellis 1990 ; Blunden 1991 ; Bridge 1990; Bridge 1991).while Walton (1989) provides market survey of US. Bocher (1993) discusses automation issues specific to small libraries.

Automation in Africa South of the Sahara is still in its infancy as already pointed out in chapter 1. Only two countries have managed to automate some of their library operations, Botswana University Library (Mbaakanyi, Ubogu and Lumonde 1993) and the Nigerian Institute of International Affairs (Adeniran, 1992). Eyitayo (1989) provides a market survey of vendors in Nigeria and the related constraints. The National Agricultural Library and Documentation Centre in Uganda has so far automated only the information databases (Parker 1989). However, plans are underway to automate library operations.

2.3 Online Catalogues

The study aims to review the work on the benefits of online catalogues. Potter (1989) describes online catalogues as a means of returning libraries to the ideal of the nineteenth century of providing access to a greater variety of materials from a single source. He elaborates that this can be achieved

through the unification of local collections, access to outside resources and incorporation of ready references. Hjerppe (1985) states that online catalogues are a continuation of attempts to satisfy the finding function of Cutter's catalogue in 1876. Hunter (1985) ; Rowley (1985) ; Bailey (1989) ; Peters (1991) provide definitions and an overview of the historical development and advantages of online catalogues. Raitt (1986, p. 411) sums up the advantages: "...the online catalogue is a central component of the electronic library and as such can improve the services, productivity and efficiency of a library as well as giving users a knowledge of and access to global information resources."

2.4 Enhancing Subject Access in Online Catalogues

This study aims to examine research on subject access problems in online catalogues, and the prospects of enhancing it. Hancock-Beaulieu (1990) ; Micco (1991) state that current online catalogues have problems in providing reasonable subject access and consequently have not improved subject retrieval. Searches resulting in either too few or too many hits. Larson (1991) explains the importance of subject access in comparison to title and author access points. Walker (1987) ; Roose (1988) indicate that the usual subject access points in online catalogues are subjects headings and title keywords. She points out that these access points are often either too basic or too difficult making the online catalogue an inadequate reference tool. Subject access is recognised as the most problematic although it predominates over other types of access points (Congreve 1986 ; Croucher 1986 ; Markey 1985 ; Larson 1991 ; Smith 1991 ; Taylor 1991). Consequently many studies have been conducted to devise means of enhancing subject access. The objective of enhancing subject access in online catalogues is underscored (Cochrane 1985, p. 287): "...to create a catalogue that brings

works together, does not separate related subjects or conceal information and allows the user to search with ease and little difficulty no matter whether the query is specific or general.”

Simonds (1984, p. 300) sums up the underlying problems of subject access in online catalogues: “The main problem with subject access is not with the online catalogues themselves. The problem lies with the database they use. The logical conclusion is that the MARC database itself is an inadequate foundation for the catalogue”.

Cochrane (1986) discusses the difficulties which users of online catalogues encounter. Hildreth (1985), Cochrane (1986), Dalrymple, and Young (1991) ; Smith (1991) review a wide range factors causing poor recall and precision. They name Library of Congress Subject Headings (LCSH) and poor authority control as major causes.

The key areas that need to be improved to enhance subject access are discussed (Lawrence 1985 ; Mandel 1985 ; Congreve 1986 ; Walker 1987 ; Roose 1988 ; Knutson 1991 ; Lancaster [et al] 1991 ; Smith 1991 ; Williamson 1991 ; Wittenbach 1992). These are:

- a. Library of Congress Subject Headings (LCSH)
- b. Authority control
- c. Keywords
- d. System interface features
- e. Record.

In addition (Markey 1985 ; Lawrence 1985 ; Chan 1986 ;, Buxton 1990 ; Kinsella 1992 ; Wittenbach 1992) suggest classification systems namely, Library of Congress Classification (LCC), Universal Decimal Classification (UDC) and Dewey Decimal Classification (DDC) to be used as retrieval other than locational tools only.

However, the most recommended area to enhance is authority control and this view is underscored by Wittenbach (1992, p. 82) in his statement: "...the most critical enhancement is through improved authority control." He explains that this is possible through establishing links between keywords in the title, abstracts, tables of contents and indexes with the existing subject authority records. This enables LCSH-rm to be updated with more current terminology and the *collocation function* of the catalogue will be fulfilled. Simonds (1984) ; Smith (1991) concur with this idea.

Cochrane (1986) ; Smith (1991) ;, Williamson (1991) define LCSH as a list of subject headings established by the Library of Congress. They emphasize that LCSH is not an authority file and they justify why it is not. Wiliamson (1991) reports that one of the weaknesses of LCSH is the integrity of its synthetic structure. Chan (1986) in her study discusses the strengths and weaknesses of LCC in enhancing subject access. The two major strong points are that several MARC based formats such as LC MARC, OCLC and RLIN carry the Library of Congress Classification numbers (LCC) apart from the most commonly used DDC. The other reason is attributed to the high integrity of LCC call numbers. Query expansion through user feedback is another means of enhancing access to the intellectual content of the library materials.

2.5 Authority Control in Online Catalogues

The study focuses on reports regarding the importance of authority control in online catalogues. Baer and Johnson (1988 ; Oddy 1991) state that the concept of authority control has been in use since the time of Cutter in 1876 and they under score the fundamental function of authority control of providing collocation and comprehensive retrieval. Park (1992) provides a detailed

discussion of the function. Ghikas (1982) ; Epstein (1986) define authority control but (Oddy 1991, p. 66) gives the most comprehensive: " a process whereby an unique, single form of words is established for a piece of bibliographic data which is not item specific, that is, the data are potentially common to more than one bibliographic record."

Baer and Johnson (1988) ; Boss (1992) attribute the need for authority control in online catalogues to the adoption of AACR2 and Epstein (1985 , 1986) discusses problems associated with it.

Advantages of authority control in online catalogues:

- a. Facilitates online catalogues to effectively integrate new items into the collection (Malinconico 1982).
- b. Enhances the finding function to the catalogue by providing consistency and integrity (Fox and Kanafani, 1989 ; Davis 1987 ; Baer and Johnson 1988 ; Park 1992 ; Mbaakanyi, Ubogu and Lumonde 1993).
- c. Facilitates catalogue maintenance through its global changes (Ludy and Rogers 1984 ; Fox and Kanafani 1989).
- d. Promotes resource sharing (Avram 1984).
- e. Provides exhaustiveness (Baer and Johnson 1988).
- f. Provides Cutter's synthetic structure of record to record for collocation (Ludy and Rogers 1984 ; Oddy, 1991). They elaborate that automation has preserved the traditional functions of authority control.

Taylor, Maxwell and Frost (1985) ; Johnston (1989) ; Johnston (1990) ; Drabenstton (1992) offer a review of vendor's offerings and capabilities in terms of authority control modules and services. Johnston (1989) states that authority control capabilities should be considered as important aspect of choosing an online catalogue and she provides 8 guidelines. Park (1992) discusses ways of transformation from the manual authority control

to online. Thomas (1984) gives a comparison between manual and online authority control.

2.6 Use of MARC Records

MARC is a standard format for the exchange of bibliographic information between automated library systems. Crawford (1984) ; British Library [1993] ; McIlwaine (1991) ; Gredley and Hopkinson (1990) define it more precisely as: "a standard format using a set of conventions to represent bibliographic information for computer handling." And MARC, stands for MACHine Readable Catalogue Crawford (1984, p. 1.) states that: " MARC is the single most important factor in the growth of library automation... MARC forms the basis for storing bibliographic information a consistent form..." Gredley and Hopkinson (1990) state that there are more than 20 formats and Hopkinson (1991) report that the best known and used national MARC formats are: United States national MARC (USMARC), United Kingdom national MARC (UKMARC), Australian national MARC (AUSMARK) and Malaysian national MARC (MALMARC). She explains that because of the diverse formats it became apparent to the national libraries to develop the International MARC, UNIMARC as their exchange formats.

Gredley and Hopkinson (1990) and Bourne (1992) state that MARC derived from the desire of the Library of Congress in 1965-6 to automate its cataloguing procedures including its card distribution services on the advent of mainframe computers.

Crawford (1984) ; Long (1984) ; Tedd (1984) ; Tedd (1987), Gredley and Hopkinson (1990) ; Byrne (1991) ; Bourne (1991) ; Bourne (1992) ; and the British Library [1993] give a detailed review of MARC history and development in the United States and United Kingdom since 1965-6. The

British Library [1993, p. 1] summarises the characteristics of MARC as: "Hospitable to all kinds of library materials, sufficiently flexible for a variety of applications in addition to catalogue production and usable in a range of automated systems."

The importance of MARC as a tool for resource sharing is understood when Miller (1992, p. 10) states that: "...age of information make access to information resource critical and sharing essential for efficiency and effectiveness." Oddy (1991) concurs with him in his statement: "No library can function effectively or efficiently on its own. Epstein (1987) ; Hopkinson 1984) ; Byrne (1991) ; Bourne (1992) discuss MARC attributes of random access and Boolean logic.

Long (1984) ; Gilchrist (1991) ; Hancock-Beaulieu (1991) attribute MARC standardisation to adoption of MARC record structure in ISO 2709 and the AACR2. Gilchrist (1991) defines standardisation and gives its origin. Reynolds (1985), Bourne (1992) discuss the stability of MARC format once created.

Truitt (1992) reports the development of UNIMARC authorities format as a big breakthrough to one of the major impediments to bibliographic exchange. Reynolds (1984) ; McCallum (1985) discuss these impediments. Gilbert (1986) ; Bourne (1992) discuss the use of MARC in harmonising the book trade and the library system, but Bourne (1992) cautions on detailed AACR2 cataloguing. Guenther (1992) reviews the potential use of USMARC for classification data, while Bourne (1992) discusses the future of MARC formats.

The use of MARC in Africa is only in planning. According to the available literature which the researcher could get hold of it is only Botswana University Library which has adopted MARC (Mbaakanyi, Ubogu and Lumonde 1993).

Chang (1990) states that MARC records have long served as the key data sources for library automation systems. Consequently the importance of MARC records in online catalogues has become apparent to many users, and as such their choice for a library system is dependant on the ability of that system to support the MARC format (Walton and Bridge 1988). Crawford (1984, p. 152) emphasises compatibility as the criteria for MARC selection: "MARC compatibility means flexibility, and allows a library to move towards an integrated system... MARC compatible systems are designed for the future... MARC provides a common ground for sharing data, without compatibility a library is foreclosing such sharing".

2.7 Ergonomics and Usability of Online Catalogues

The study is concerned with ergonomics and usability of the catalogue interface in relation to catalogue creation, maintenance and document representation. Usability of a system interface must complement the functional requirements (Lindgaard 1994, p.16). Studies provide variant definitions of usability (Trenner 1987 ; Booth 1989 ; Ravden and Johnson 1989 ; Hancock-Beaulieu 1992), but (Shackel 1991, p.24) provides the most widely used definition.

Usability in online catalogues is very crucial since they are used by the staff and as well as the patrons over the OPAC (Hildreth 1985). Hancock-Beaulieu (1992) echoes this view. Peters (1991, p. 50) emphasises the importance of needs analysis in his argument that systems have to be acceptable to users with their specific needs. Lindgaard (1994) and Burton (1987) provide guidelines for needs analysis. The criteria for usability in online catalogues are outlined (Borgman 1986 ; Matthews 1987 ; Hildreth 1985). These are:

- ease of use
- friendly and cordial
- protective and forgiving
- reliable and responsive
- adaptive and flexible.

Matthews (1987) provides guidelines for screen layout in relation to usability. Hildreth (1987) emphasises that the challenge for usability requirements is not whether or not the online catalogue can cater for the first time user, but whether or not it can easily be used by any user for any type of query. The importance of human factors and ergonomics for effective library automation is emphasized (Baker 1989 ; Morris and Barnacle 1989 ; Manson 1990 ; Dyer and Morris 1990 ; Dyer 1992).

2.8 Evaluation Methods for Microcomputer-based Library Software

Selecting a system that best meets the needs of a particular library is not always simple (Tenopir 1984). The volatile nature of the automation market place makes the evaluation process a necessity to be able to determine the extent to which the system meets the technical performance. Rush (1985, p.107) sums up the objectives of evaluation process. Leeves (1994, p.1.) argues that although system functionality may be the most important, other factors such as hardware platform, portability, networking and vendor support deserve serious consideration. Wong (1993, p.13) holds that evaluation is an integral part of any development. Siegel (1984) provides a comprehensive evaluation of system features and attributes of online catalogue systems. (Rowley 1990, p.225-235 1992, p.393, 396) provides guidelines for evaluation of the cataloguing module.

Studies on evaluation of library systems recommend the objective approach of

checklists to evaluate functionality and usability. Ravden and Johnson (1989) emphasize the need for a practical method in evaluation. Rush (1985), Ravden and Johnson (1989), Matthews, Williams and Wilson (1990) provide checklists. The study will adopt the checklist by Rush and Ravden & Johnson which are the most comprehensive. Chapter 4 will provide a detailed analysis of the methodology as it applies to the online catalogue systems.

CHAPTER 3

THE COLUMBIA LIBRARY SYSTEM

3.1 Introduction

This chapter aims to provide a general review of the Columbia Library System in terms of its features for functionality, usability and MARC support.

3.2 Overview of the Columbia Library System

The Columbia Library System (CLS) originally known as Ocelot Library Software (Côté 1987 ; Matthews, Williams and Wilson 1990 ; Wong 1993) was developed in Canada. The first version of Columbia Library System was marketed in 1990 and it has since then been extensively used in the United States and Canada, but is still relatively new in the United Kingdom. From the market survey of the European Community, Larsen (1992) indicates that CLS ranks among the first top 20 of small integrated systems, and Matthews, Williams and Wilson (1990) quote more than 750 users of the system. It is an integrated library system and capable of supporting a Local Area Network (LAN). Manson (1989) defines and gives the criteria for an integrated system. The system supports five main modules: Catalog (with Authority Control), Online Public Access (OPAC), Circulation (with Utilities), Acquisition and Serials control. In addition it has the MARC Interface and Files/DOS sub modules. Each of the modules can be purchased and installed separately. However, the Catalog Module controls all the bibliographic data for all other modules. In view of this it is advisable to install any other

module together with the catalogue. For efficiency and economies of scale it may be worthwhile to buy a complete system.

Matthews (1986) evaluated the circulation control module under its original name Ocelot Library Software. Later Matthews, Williams and Wilson (1990) evaluated version 2.0 under its current name, using a demonstration package. Six critical system attributes for evaluation were considered: feature, data storage, performance, ease of use, documentation and customer support. They gave it an overall rating of 7.3 out of 10 and their overall assessment states that:

“The Columbia Library System is a very good product that is stable, easy to use and has excellent support. This product meets the needs of many libraries and deserves to be seriously considered.”

They also stated that potential buyers should be aware that the performance and conduct of the demonstration package may vary from the live software. They also stress that all system capabilities change over time and recommend potential customers always to evaluate candidate systems first hand. It is against this background that the Researcher undertakes to evaluate the Catalog Module of the system, using “live software ” (Tedd 1994, p.91)

3.2.1 Documentation

Each module of the Columbia Library System has a manual provided on (9"x7") 3-ring binders with tabs. To avoid duplication some of the manuals especially Utilities and Circulation apply “shared documentation” for chapters common to several system components. Analysis of the Catalog manual indicates that it is easy to use because of the tabs. The layout is crisp and clear. The text is clear, augmented with examples and sample screens. It has an index, glossary and table of contents. However, under **Cross**

Referencing it would be clearer if 'Adding reference' was included apart from 'Changing reference'.

3.2.2 Hardware Configuration

The minimum workstation requirements to run the Columbia Library System version 2.08 are:

- Microcomputers IBM PC or compatibles
- RAM 4 MB
- Colour Monitor VGA or higher
- PC DOS/MS DOS 3.3 or later
- Hard disk: 60 MB and at least one high density disk drive: 1.44 MB 3.5" or 1.2 MB 5.25"
- LANS supported: Novell, 3COM, PC-LAN. (optional)

However, it is important to note that CLS does not make use of expanded memory (Enhancement #1, 1993). The user can compute the disk space requirement for either stand alone or network by the guidelines provided in the "configuration records" sheet in the Catalog Module.

Workstation Requirements for MARC Interface:

- CLS MARC Record Interface Program
- Vendor's diskette containing Marc Records and vendor's manual
- The Catalog Module fully installed and initialised.

3.2.3 Software Design and Portability

It conforms to the American National Standard for Bibliographic Information Interchange (ANSI Z 39.2) which makes it portable across several hardware platforms. CLS supports MARC format for bibliographic records and authority control. Boss (1990) outlines the important standards that must be adhered to in an automated library system. He elaborates that

standards will make it possible for a library to move its database from the initial automated library system to a later generation of systems without costly rebuilding of the database. Linking of a library system with others requires conformity to standards.

3.2.4 System Interface

Columbia Library System uses both, pull-down menu and command interfaces as detailed in the Catalog Manual 83112.

3.2.5 Data Storage

According to (Matthews, Williams and Wilson 1990) Columbia Library System stores large amounts of data. It can handle over 150,000 titles and up to 20,000 patron records. The system imports and exports bibliographic and authority files in MARC format (enhancement #1, 1993). However, the disk storage is influenced by the number of modules installed, terminal for OPAC and Local Area Network (LAN). Matthews, Williams and Wilson (1990) recommend it for small and medium libraries. The National Agricultural Library and Documentation Centre in Uganda is a small library with six branch libraries, so it will find CLS a suitable software especially because of its ability to support a UNION database and data exchange.

3.2.6 Utilities

The Utilities Module supports several programs to facilitate the functioning of the cataloguing system. The user has the option to adjust the default settings of the programs to tailor them to the local preferences. The programs are:

a. Security

Security is an integral part of the library system. CLS comes with a

default high level username and password. These are accessed by only one person, the overall controller who has the authority to assign and or modify all usernames and passwords to the system users. A security user profile has three elements: Username, Password and Security level numbers to exercise control over access to files and functions.

b. Back-up

The Columbia Library System provides two options to back-up data files, that is files with extension .DAT. The options are:

- ***Columbia Library System Back-up/Restore Program***

This has the advantage of checking for open files on the network and allowing them to be closed. It also maintains an automatic weekly back-up log. The disadvantage is that it is slow.

- ***DOS Back-up/Restore program (enhancement #1,993)***

DOS Back-up and Restore program from the File/DOS menu, has the advantage of being faster than LS back-up program. The disadvantage is that it has neither the facility for automatic back-up log nor for checking open files on the network.

c. Interface Screen Messages

The system has pertinent screen messages but it allows the user to edit them to tailor them to local preferences.

d. Screen Colours

The system facilitates usability by allowing the screen colours to be modified to suit colour perceptions of the user.

e. Rebuilding Database Files

The system supports database files to be rearranged to make use of the unused space available to the system. The objective is to increase the speed of searches for data. This function is carried out under the utilities option.

f. Rebuilding Keyword Indexes

The system allows the user to rearrange the keyword indexes.

3.2.7 Files/DOS

This option allows the user to manipulate several operations without exiting to DOS. These are: View Selected Files, Print Selected Files, Delete Selected Files, Back-up LS data files, Restore LS Data Files, Execute DOS Commands.

3.2.8 System Update and Enhancement

Columbia Library System is updated and enhanced annually (enhancement #1, 1993, p. v). On future enhancement Ham (1993) states that:

“within two years the Columbia Library System's program will be rewritten to run on Microsoft Windows. This will provide greatly enhanced capabilities for the system, but it will also require a hardware platform capable of running windows, a 386 or fast microprocessor, with at least 4 MB of RAM, a colour monitor VGA or better and a mouse. The OPAC will continue to be provided in a DOS version for ease of use”.

The program for Sending, Transferring and Receiving communication records became obsolete with Catalog Module version 2.06. Exchange of records is now handled by MARC record Interface.

A detailed description of all the modules is beyond the scope of the study except for the Catalog Module.

3.3 The Catalog Module ver. 2.08

The Catalog Module provides bibliographic control of records for the library collection, through the finding, gathering and collocation functions of a catalogue as noted by Cutter, 1876. It is essential to automate the catalogue to promote resource sharing and to benefit from shared cataloguing especially in the light of ever shrinking library resources. Tedd (1984, p. 99) state that since the early 1960s when computers were first introduced in the library, the catalogue was the first to be computerised. She provides a detailed description of the benefits of an automated catalogue. Reynolds (1985) ; Raitt (1985) ; De Gennaro (1987) ; Lietz and Paulson (1987) ; Hildreth (1989) highlight the benefits accruing to catalogue automation.

The underlying essence of a catalogue is to provide access to library materials, but the needs of patrons have changed with time, because apart from knowing that a library holds a book they would like to know how soon it will be available. This has been made possible through the OPAC which facilitates the linkage of catalogue bibliographic records with the record circulation status in the circulation module. Matthews, Williams and Wilson (1990) state that a Catalog Module should allow cataloguing and database maintenance, while Hawks (1988) emphasizes report generation.

3.3.1 Installation

The process of installation is beyond the scope of the study. Details are available on the installation diskette.

3.3.2 Initialising Catalogue Files

It is a pre-requisite to complete initialisation of catalogue files before cataloguing any item (Catalogue manual 83112). Although there is the option to alter some of the parameters to "OFF" or "ON" positions, during data base maintenance care must be taken especially with the keywords. Caution is also given not to alter the stop word list. To start the initialisation process select Initialise catalogue Files from the Main Menu and **Enter**, following the path as under

Catalogue Main Menu

- . Select Initialise Catalogue Files
- . Enter Y at Choice

Fig. 3.1 Initialising Catalogue Files

The system will display six files to be initialised in a sequence as shown in Fig. 3.2:

Catalogue File Initialisation

- . Set Record Sequence Number (RSN)
- . Set Validation Flag
 - . Select Spine Label Option
 - . Enter Call Number Break Character
 - . Set Union Catalogue Flag
- . Set Keyword Flag

Fig. 3.2 Sequence of File Initialisation

The purpose of setting the Record Sequence "ON" is to enable the system to assign automatically an 8-digit sequential number to every title that is added to the bibliographic database. The validation flag is set "ON" to facilitate the

system to have control over headings, reduce error, duplication and avoid redundant entries to ensure the integrity of the catalogue. The spine label option allows the library to set characters at which the system should break the class mark. If it is left in the "OFF" position the system will break it by default. On the other hand if the labels are not required, select 5 at choice. Setting the union flag "ON" activates, Editing Union Location Table to enable the library to set the branch library locations. Finally, setting the keywords flag "ON" activates the program to provide a table for all fields on which to build Keyword Indexes. The details are provided in the catalogue manual 83112.

On completing the initialisation the system is ready to perform the cataloguing functions. These are:

3.4 Cataloguing Functions

3.4.1 Data Entry and Database Maintenance

Hunter (1985) explains that data entry and database maintenance are the major operations of cataloguing and they are carried out together continuously. The cataloguing module of Columbia Library System allows data entry in several ways. These include original cataloguing, batch from MARC tape loading and online. The study will confine to original cataloguing. To start the process select the Catalogue Menu and follow the path in Fig. 3.3.

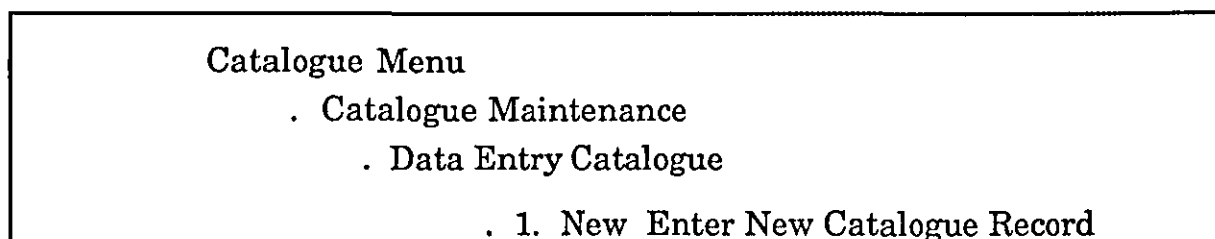


Fig. 3.3 Cataloguing New Records

3.4.2 Cataloguing New Records

To begin cataloguing choose 1. New Enter New Catalogue Record and the system will present five screens in a sequence prompting for bibliographic data. The first is the Name (Author) entry screen which accommodates a maximum of eight name entries. The catalogue manual supplies the type tag to identify the authorship. These are:

<u>Name Type</u>		<u>Type Tag</u>
Main entry	- personal name	10
Main entry	- corporate name	11
Main entry	- meeting/ conference	12
Added entry	- personal name	70
Added entry	- corporate name	71
Added entry	- meeting/conference	72
Series	- personal name/title	80
Series	- corporate	81
Series	- meeting/ conference	82

Table 3.1 Author Field Tags

The TAB key facilitates the movement from one field to another, while the Insert, Delete and Arrow keys allow correction of errors. When all the names have been entered press RETURN.

The system automatically checks if the correct type tag is entered for each name type. If it is wrong, an error message is displayed on the screen. If the validation flag is set to "YES" the system will compare each name as it is entered with the existing entries and it will subsequently display the name entered and three names in the authority file that are the closest to it. There are three options, to link the new name by selecting it, or editing the original name or selecting another name and RETURN. However, if the record has no authorship associated with it, just enter the first tag, 10 and RETURN, to

be able to proceed to the next screen in the sequence.

The subject entry screen comes next, and it allows entry of eight subject headings. Each is identified by the pertinent type tag supplied by the catalogue manual 83112. The process is virtually the same as for name entry. The tags are:

<u>Name Type</u>	<u>Type Tag</u>
Personal name	60
Corporate name	61
Meeting /Conference	62
Uniform title	63
NASA Subject	64
Topical	65
Geographical	66
Reversed geographical	67
Genera	68

Table 3.2 Subject Field Tags

The title entry screen provides for eight titles and the procedure is the same as described already for name and subject. The type tags are:

<u>Name Type</u>	<u>Type Tag</u>
Main entry	13
Uniform title	24
Title proper	25
Romanised title	26
Translation	27
Collective title	28
Series	44
Added entry /traced differently	49
Added uniform title	73
Added title	74
Series - uniform title	83
Series - not in series	84

Table 3.3 Title Field Tags

However, the system gives the option to include the statement of responsibility with the TITLE PROPER, separated by space-slash-space (/) (as in AACR2). If the statement of responsibility is not entered in the title proper the system will generate one automatically from the tracings in the names fields.

The fourth is Biblio Root entry screen, which accommodates all the fields stored in the "root" part of the record structure. The fields are "fixed" and they are not subject to validation except that the system automatically verifies the ISBN and ISSN. The six fields are: F07, F15, F17, F57, F66 and F84 and they are derived from field 008 of the MARC Record. The TAB key facilitates the movement from one field to another.

Next, the spine label entry screen is displayed and the system prompts for the quantity of labels per title, ranging from 0 to 99. The call number is automatically inserted. To print at the end of each record set the PRINTING at "O" and at "B" in batch. Subsequently the system prompts for BARCODES if the circulation flag is ON. Since the study is concerned with the Catalog Module the BARCODES will not be dealt with. If the title has more than one copy the COPY INFORMATION screen will be displayed.

The last is Notes entry screen which accommodates abstracts, reviews or any other textual information up to a maximum of 1900 characters. The MARC fields 500 to 589 may be copied into this Note field.

3.4.3 Adding New Record by Copying

To start copying the catalogue record select 2. and follow the path Fig. 3.4.

Catalogue Menu
. Catalogue Maintenance
. Data Entry Catalogue
. 2. Copy Create New Record from Old Record

Fig. 3.4 Creating New Records by Copying

By copying an existing record you can create a new record by changing the appropriate information in the record. This is often used for a new edition of a title and the objective is to minimise on errors. The copied record gets a RSN. You search for the bibliographic record by entering a search term prefix such as "t" for title, "s" for subject, "a" for author, "r" for RSN, "c" for LCCN, "i" for ISBN and subsequently the record will be retrieved.

3.4.4 Change Old Record

The procedure for modifying the old record is virtually the same as for creating a new record from old. Once the full record is retrieved the system offers the options for editing any of its parts: 1. Biblio 2. Authors 3. Subject 4. Titles 5. Notes 6. Cardset.

3.4.5 Deleting Catalogue Record

To start deleting a record select 4 and enter a search term as described in editing and then select "D" and follow the path Fig. 3.5.

Catalogue Menu
. Catalogue Maintenance
. Data Entry Catalogue
. 4 Delete Entire Catalogue Record

Fig. 3.5 Deleting Entire Record

The process of deleting is done automatically in a sequence: Names, Subjects, Titles, Biblio Root, Notes, Keywords.

3.4.6 Editing List of Catalogue Records

This option allows the user to print the list of catalogued records to check for accuracy of data entry and spelling mistakes. To start the process select 5 and a screen will be displayed for search terms to retrieve the records for deletion. The list can be formatted for bibliographic citation for newly catalogued books or printed directly to produce New Book Lists. The list can be saved to disk file in MARC format.

3.5 Authority Control

The cataloguing system maintains an authority file to control used headings in the catalogue records and their collocation. The system builds the authority file for author, subject and title automatically by interpreting the type tag of entry in the catalogue record. On the other hand collocation is accomplished by cross referencing directly through the "See" and "See Also". Cross referencing is done on completing the record entry.

3.5.1 Adding “See” References

This function allows the user to link all works by a given author, synonyms terms or alternate spelling of terms and variant titles. To start the process of adding a “See” reference heading select “A” at the Choice prompt and the system will prompt for the type tag and the used heading and follow the path Fig. 3.6.

Authority Control
. Change “See” Reference
. Add “See” Heading
. Edit “See” Reference
. Delete “See” Reference

Fig. 3.6 Adding “See” Reference

Field tags for “See” Names are :

<u>Authority Field Type</u>	<u>Type Tag</u>
Personal Name	40
Corporate Name	41
<u>Meeting / Conference</u>	<u>42</u>

Field tags for “See” Subjects are :

<u>Authority Field Type</u>	<u>Type Tag</u>
Topical Subject	45
Geographical	46
<u>Reversed Geographic</u>	<u>47</u>

Field tags for “See” Titles are :

<u>Authority Field Type</u>	<u>Type Tag</u>
<u>Uniform title</u>	<u>53</u>

Table 3.4 Field Tags for “See” References

The user has the option to enter either one word of the heading and the system will carry out automatic truncation and left-justified search or to enter several words in the order they appear in the heading. However, the heading may be added only if it does not appear as a used heading in the part of the bibliographic record. The system asks the user to validate the authority entry and it will check the entry against the "See" references in the authority file and subsequently display the three which are the closest matches. EDITING "See" headings and DELETING "See" headings take almost the same procedure as for adding. Details are provided in the catalogue manual 83112.

3.5.2 Adding "See Also" References

The system allows the user to link headings from a broad or relatively non-specific heading to a narrower more specific used heading. To avoid blind references only used headings are linked. To establish the "See Also" references select "A" and enter the search term for the used heading and the pertinent type tag and follow the path Fig. 3.7

Authority Control Menu	
. Change "See Also" Reference	
. Adding "See Also" Heading	
. Editing "See Also" Heading	
. Deleting "See Also" Linkage	

Fig. 3.7 Adding "See Also" Reference

The type tags for "See Also" Names :

<u>Authority Field Type</u>	<u>Type Tag</u>
Personal Name	50
Corporate Name	51
<u>Meeting / Conference</u>	<u>52</u>

Type tags for “See Also” Subject :

<u>Authority Field Type</u>	<u>Type Tag</u>
Topical Subject	55
Geographical	56
<u>Reversed Geographic</u>	<u>57</u>

Field tags for “See Also” Titles are :

<u>Authority Field Type</u>	<u>Type Tag</u>
Uniform title	53
Uniform title	43
<u>Collective title</u>	<u>45</u>

Table 3.5 Field Tags for “See Also” References

The system will ask the user to validate the headings before they are accepted. To EDIT “See Also” headings and DELETE “See Also” linkages the process is similar to that of adding already described.

3.5.3 Changing Used Headings

The function of changing used headings allows the user to make global changes to the used headings. However, it should be used cautiously because used headings form part of one or more bibliographic records. A change in a heading means changes to all citations sharing that heading. The system only has the capability of only blocking some erroneous changes such as making a “See Also” to itself. To start the process of changing used Names select 3 and a screen for the search term will be displayed and follow the path Fig. 3.8

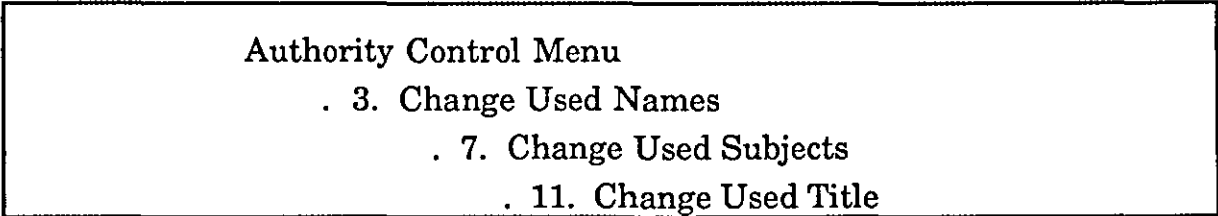


Fig. 3.8 Changing Used Headings

The changes are normally achieved through MERGING HEADINGS. The system allows for similar headings to be merged and dissimilar headings as well. Similar headings may be merged if a heading is mis-spelled and has been added as a new heading ; improperly validated and added as duplicate or if the head changes. On the other hand dissimilar headings are changed when there is a change in the heading such as a change of a name. The system automatically deletes the used headings when the last citation is deleted.

3.5.4 Reviewing Cross References

The system allows the user to review online the cross references structure and used headings. To start the process follow the path Fig. 3.9

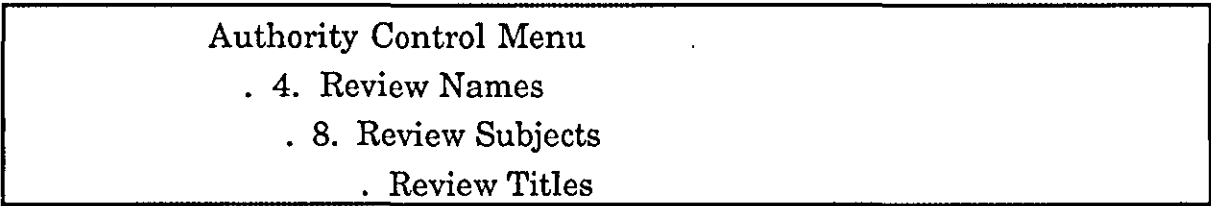
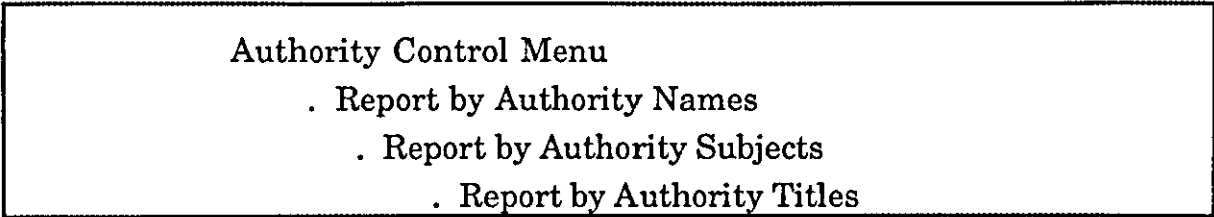


Fig. 3.9 Reviewing Cross References

The procedure for the three options is almost the same. On selecting 4 the system prompts for the search term by: “See” or “See Also”, or “Used Headings”.

3.5.5 Reporting Cross References

The system allows you to produce authority control reports on used headings, ‘See’ and ‘See Also’ references. To start the process of producing a report for names select 13 and the system will prompt for the search terms for: “See”, “See Also” or Used heading and the report format. Follow the path Fig. 3: 10

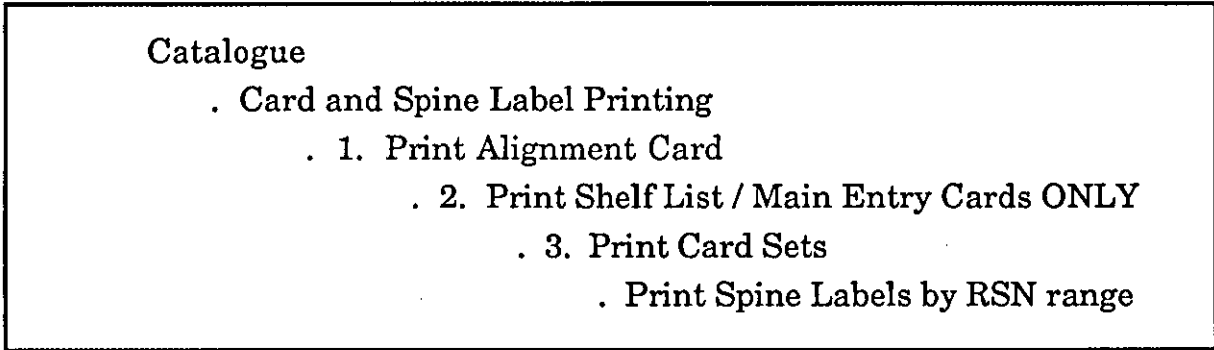


```
Authority Control Menu
. Report by Authority Names
. Report by Authority Subjects
. Report by Authority Titles
```

Fig. 3. 10 Authority Control Report

3.6 Printing Cards and Spine Labels

The function enables the user to print catalogue cards and or spine labels if the Print Card and Spine Labels Flag is "ON".



```
Catalogue
. Card and Spine Label Printing
. 1. Print Alignment Card
. 2. Print Shelf List / Main Entry Cards ONLY
. 3. Print Card Sets
. Print Spine Labels by RSN range
```

Fig. 3.11 Printing Cards and Spine Labels

The system offers several options. These are:

- a) Main Entry / Shelf List Cards for all Records within a given range of RSN (*Appendix i*)
- b) Complete card set which comprise of shelf list, main entry, added entry, title and subject.
- c) Spine and pocket labels for all records within a range of RSNs. (*Appendix ii*)

The same could be printed for the Union locations if the UNION Location Flag is "ON".

3.7 Management Reports

The Catalog Module supports several management reports. Some are produced by default while others are generated on demand.

3.7.1 Catalog Reports

Catalog reports are produced by default under the Utilities Menu. They comprise of statistical as well as text reports. These are:

a) Statistical Reports

There are three types of statistical reports. These are:

- Catalogue editing counts reports:
These allow the user to determine the number of catalogue records that have been edited by date range.
- Title count, all records reports.
These allow the user to determine the total number of titles of given RSN in the database. (Appendix iii)
- Title count, by date range reports. The user is able to establish the number of titles in the database that were added by date range.

b) Text Reports

The system allows three types of text reports to be printed in short form. These are:

- Title list by call number order
- Title list by Union Location
- Title list by medium. (Fixed field F66).

3.7.2 Activity Reports

These reports are produced under File/DOS and they are sorted by date range. These are:

a) Catalogue Report Files

Several reports are produced. These are:

- Barcodes entered in Catalog
- LABEL.CAT, Catalog report
- New authors entered through Catalog
- New subjects entered through Catalog
- New titles entered through Catalog
- OPAC system statistics report
- OPACLG.DAT, Catalog report
- OPACSTAT.DAT, Catalog report.

The disadvantage with this option is that, by default the system selects or deselects all the files when the user presses the plus or minus sign on the numeric key pad. This means that the user has no choice over the files to print.

b) MARC Report Files

Several reports would be produced, but the study did not allow the loading of records by MARC leader, so there were no reports produced.

c) Utilities Report Files

This file provides the activity report of library system backup, database reorganisation and the year's message of activities.

3.7.3 Authority Control Reports

Under Authority control Menu, three types of reports are produced. These are:

- a) Report by Authority Names (*Appendix iv*)
- b) Report by Authority Titles
- c) Report by Authority Subjects.

For each type of authority report, the user is able to generate reports by:

- "See" references
- "See Also" references
- Used headings.

3.7.4 Pre-formatted Reports

The report writer facility permits the user to sort temporarily on several fields of the pre-formatted reports to tailor them to local needs.

3.8 MARC Support

To access MARC facility, log on the MARC Option and follow the path Fig. 3.12.

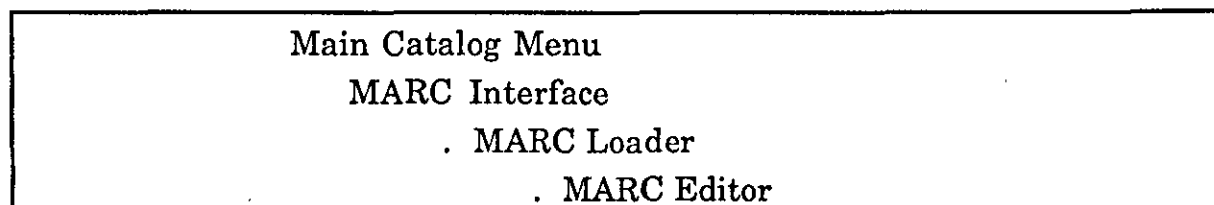


Fig. 3.12 MARC Option

The system allows the user to load diskettes from the vendor or Union Locations by MARC Loader. The interface supports several types of the

commonly used vendor MARC formats. This offers flexibility to the user over his choice. However, if the user finds that the format he wants to load differs from those being supported by the system he has the option to edit a copy of any of them that is closest to his match. The vendor formats supported are:

- MST-BIBLIO - For records from BblioFile cataloguing system
- MST- COMM - For MARC communication records from the
bibliographic utilities: OCLC, UTLAS, WLN, RLIN,
Marcive, LC MARC etc.
- MST- GEAC - For MARC screen records from GEAC online catalog.
- MST- LIF - For book jobbers
- MST - MITNET - For records by MINTNET card catalog software.
- MST - MINI - For records output by MINISIS
- MST - NEARFIL - For text records conforming to ASCII
- MST - OCLC - For OCLC screen records.

The interface also supports several default pre-defined tables for exporting and importing records. These are:

- CLS-LOC-TO-UNION - For exporting from location to union
- CLS-UNION-TO-LOC - For exporting to location

CHAPTER 4

METHODOLOGY OF SYSTEM EVALUATION

4.1 Introduction

The purpose of this chapter is to provide an objective methodology for effective evaluation of the Catalog Module of the Columbia Library System to ascertain its technical performance. There are several computer-based cataloguing systems on the market that are appropriate for library automation but choosing one that best meets specific user needs has always been difficult (Tenopir 1984).

The situation is compounded by the fact that automation is a long term commitment involving relatively large capital investment (Matthews, Williams and Wilson 1990). Burton (1987) emphasizes that even microcomputer-based systems take up a large portion of the library capital budget. Knutson (1993) asserts that the librarian faces the great challenge of providing economical and fully satisfactory catalogue for the user in a time of diminishing resources. According to (Foskett 1982, p. 518) "...the providers of funds begin to question whether they are getting value for their money". All these factors have made it necessary to evaluate software before acquiring it as he adds "Librarians have become aware of the need to evaluate the systems they use...".

4.2 Review of Evaluation Methodology

Rush (1985, p.107) discourages subjective methodology where potential customers write the functional specifications of the system and use them as

a basis for the evaluation, He argues that:

“One might suppose that the best way to evaluate cataloguing systems is first to write detailed functional specification (a detailed description of system behaviour) from the user point of view and then use specifications as a basis for comparison of available systems”.

He explains that this approach is costly, time-consuming and implies that the writer prejudices the knowledge of the system designer. It cannot provide an empirical basis for evaluating any other system. Boss (1990) is also opposed to specification development on the ground that the specifications may reflect “idealistic capabilities” rather than the “realities” of the prevailing market trends. Rush (1985), Burton (1987), Ravden and Johnson (1989), Matthews, Williams and Wilson, (1990) all emphasize the use of objective evaluation methodology based on a checklist which provides a standardised and systematic approach. Ravden and Johnson (1989,p.17) explain that the importance of the checklist is that it enables the evaluator to carry out realistic tasks which the system has been designed to perform. He adds that realistic tasks provide the most effective way of demonstrating the systems technical performance in a holistic way which exposes the evaluator to virtually all aspects of system functionality and usability. In essence the method aims to establish the presence of attributes which a well designed user interface should have. Tedd (1984,p.104); Rowley (1992,p.393) outlines the criteria for an ideal computer-based cataloguing system. Bailey (1989) states that: “The first step is to ascertain the necessary functionality - what tasks and subtasks must be carried out..... Task analysis is central because systems with inadequate functionality frustrates the user and are often rejected or under-utilised.” Shneiderman (1992,p.10) emphasized that: “If the functionality is inadequate it does not matter how well the human interface is designed.” Rush (1985), covers functionality well but falls short on usability and yet (Dyer and Morris 1990,p.167) emphasize that for effective

implementation of library automation users should be able to interact with the system with ease. Ravden and Johnson (1989) provide a comprehensive methodology based on ten criteria for usability.

To achieve comprehensive evaluation of the Catalogue Module of the Columbia Library System the Researcher undertakes to evaluate "Functionality, Usability and MARC support." The latter attribute is important for the benefits that accrue to standardisation shared cataloguing and resource sharing. The study adopts the Rush methodology for functionality and MARC support, and then Ravden and Johnson methodology for usability. The two methods provide an empirical approach which can be used by a variety of people with differing experience and background.

4.3 Rush Methodology for Functional Requirements of a Cataloguing System

The methodology provides a comprehensive evaluation methodology in a series of eight volumes, in concise, easy to use format of basic information on the requirements for and techniques of evaluation of an automated library system: Serials control vol. 1., circulation control vol. 2., Public Services (OPAC) vol. 3., Acquisition vol. 4., Management Services vol. 5., Inter-library Loan vol. 6., Cataloguing vol. 7., and System Integration vol. 8. The study adopts volume 7, since the core of the study is the cataloguing system. The methodology comprises of eight phases. These are: 1. Setting objectives. 2. Fine tuning of the components of the methodology to agree with the objectives. 3. Selection of the candidate system for evaluation. 4. Examination of system descriptive literature and documentation. 5. Comparison of candidate system against the function and feature tables and MARC data elements. 6. On-site evaluation of the candidate system. 7.

System selection and acquisition. 8. Post-installation evaluation. However, the study is not able to follow them to the fullest extent under a simulated environment.

4.3.1 Setting of Objectives of the National Agricultural Library and Documentation Centre

The National Agricultural Library intends to purchase an integrated library software package to automate the library operations in phases starting with the catalogue. This will enable it to centralise acquisition and cataloguing for all the six branch libraries. On the basis of the needs analysis, the objective of the library is to provide an effective and efficient computerised catalogue, which fulfils the finding, gathering and collocation functions of a catalogue as defined by Cutter, 1876. The Catalog Module of the Columbia Library System is at the disposal of the Researcher for evaluation with reference the objectives of the Agricultural Library. The functional system requirements are defined in broad terms that are realistic to the current software market. These are:

a. General Requirements

A computer-based cataloguing system should:

- support the creation of and maintenance of bibliographic records and authority files.
- support thesaurus and classification schedule data files.
- conform to standards to facilitate shared cataloguing and portability.
- support the creation of a single system wide bibliographic file shared by all modules.
- interface with MARC, circulation, OPAC, acquisition, and serials modules but capable of being installed and function alone.

- facilitate easy movement from function to function.
- have the capability for upgrading.
- be reliable
- provide pertinent help and messages.
- be flexible to permit some default values to be defined to the local preferences
- have an override facility to allow some of the default parameters to be overridden to meet some local conditions.

b. Cataloguing Data Entry

A computer-based cataloguing system should support comprehensive and efficient entry of descriptive and ascriptive bibliographic data via online, keyboard or batch. It should guide data entry by providing the appropriate screens, field tags and prompt for the data.

c. Data Update and Conversion

The system should allow mass entry of data and update before it can be added to the master data base. This function is vital for the Agricultural Library since it intends to maintain a union catalogue.

d. Catalogue Maintenance

The system should ensure the consistency and integrity of the data through catalogue maintenance on a continuous basis. To achieve this the system should facilitate: editing of old catalogue records, deletion of entire catalogue records, editing list of catalogue records and maintenance of catalogue index.

e. Validation and Verification

The system should have the validation and verification functions at data entry and maintenance to ensure accuracy and consistency. The system should provide by default most of the data element identifiers such as tags and codes required for recording bibliographic data. If the cataloguer has to input the identifiers the system should verify their accuracy and if a wrong one is used an error message should be displayed. In addition, the system should validate the accuracy of input values such as used headings and the International Standard Book Number (ISBN) and ensure conformity to the prevailing de jure and de facto standards: AACR2, MARC and ISBD.

Internal consistency is very important for the integrity of the catalogue, therefore the system should verify and validate the element identifiers and data element values again after cataloguing. The system should automatically verify and validate the record structure and it should not be overridden. The facility for error detection and correction as data is input or in batch is essential. Rush (1985, p.60) states that a cataloguing system without spelling detection is no longer acceptable.

f. Authority Control

Authority control is even more important in a computer-based catalogue than in the manual to ensure efficient cataloguing and retrieval. In view of this the system should ensure vocabulary control and collocation by exercising control over the used headings and establishing "See" and "See Also" references. To achieve this the system should be capable of loading and maintaining an online authority list to validate headings. It should safeguard against "blind references" by ensuring that "See Also" references are established for used headings only. It should generate index terms and a facility for maintaining them. Record format, punctuation, spacing and

capitalisation should also be under authority control.

g. Search and Retrieval

The search function should allow easy and fast access to the various data files which support cataloguing for record creation and maintenance. To achieve this the system should maintain sound catalogue indexes for all the database files. It should support search tools such as Boolean operators, relational connectives, general qualifiers and truncation. The system should support several access points to the data files to ensure effective retrieval. The access points should include keywords, names, subjects, collation, classification number, form of material, standard and local identification numbers such as ISBN, MARC tags and RSN. This function is very important since it serves both the library staff for data entry and catalogue maintenance as well as the patrons at the OPAC.

h. Printing

The system should permit the printing of a range of materials such as spine labels, catalogue cards, notices, accessions list, shelf-list, reports and routing slips. The function of printing cards is important to the National Agricultural library because the manual catalogue will be run parallel to the online, as a safe guard against likely power or system failure. Spine label printing is essential for efficiency. The system should also be flexible to allow variety in printing. Price (1984) discusses online catalogue printing.

i. Access Control

The system should allow various security levels to ensure control over data entry and update of bibliographic and support data files. Rush (1985, p.87-88) suggest a two tier approach supported by several levels of access control and augmented by allowing particular functions to be confined to given

terminals. The first tier should be given access to the cataloguing system and its various major functions at six levels of access. For ease of use the system should allow these levels to be governed by system tables administered by the master controller. The second tier of access control applies passwords to govern actual processes carried out in particular circumstances. For effective implementation of access control the system should maintain an audit trail for any changes or attempted changes to access control.

j. Backup/Restore

The system should have the capability to run a backup program for a range of data files to safe guard against damage to or loss of the data base. It should allow automatic log of the backup and if it is not carried out a message to remind the cataloguer should be displayed. The restore function should be available otherwise the backup function will not serve its purpose.

k. Management Reports

Hawks (1988) emphasizes the need for management reports from a cataloguing system to provide work-flow analysis to enable records which do not meet certain standards to be reviewed. The system should support the generation of a wide range of reports either online or in batch. Those of immediate use such as critical daily activity reports should be produced by default such as for items received, catalogued, processed and shelved. Data entry and vocabulary control reports for items not found in the authority file. The success of day to day operations much depends on a number of management reports. To manage subject headings it requires a report for new subject headings and the dropped subject headings.

1. Enhancing Subject Access

The function of enhancing subject access in a cataloguing system is vital for improving access to library materials. The system should have the capability to derive subject terms from title, table of contents and tracings as the item is catalogued.

4.3.2 Fine Tuning of the Methodology

The methodology critically analyses the function and feature table for functionality and data elements checklist for MARC support to assess whether they agree with the objective of the National Agricultural Library of having a good catalogue. The methodology ensures that the essential and critical functions in particular are included. These functions and features are adapted to form the criteria against which the candidate system is compared. Each function and feature is given a numeric weights which will appropriately reflect relative importance which the Library attaches to them.

4.3.3 Examination of Descriptive Literature and Documentation of the Candidate Systems

This phase examines descriptive pertinent literature and system documentation. The procedure involves checking the documented functions and features of the system against those critical functions and features refined in 4.3.2.

4.3.4 Evaluation of the Candidate System under Simulated Library Environment

This is the most fundamental phase which involves the evaluation of the candidate system in an operational setting. The system is evaluated for its functionality under a simulated library environment by critical comparison and scoring. The details are provided in Chapter 5.

4.4 Ravden and Johnson Methodology for Usability Requirements of the Catalogue Interface

Ravden and Johnson provide a structured and systematic tool in the form of a checklist to apply in evaluation. This was developed during collaborative research with reference to notable sources: Clegg et al., 1988 ; Smith and Moiser, 1986 ; Gardner and Christie, 1987 and Shneiderman, 1987. The methodology gives ten criteria. These are: Visual clarity, Consistency, Compatibility, Informative feedback, Explicitness, Appropriate functionality, Flexibility & control, Error Prevention and correction, User Guide support and General System Usability. The Researcher considers this to be the most comprehensive and appropriate for evaluating the usability of library automation system.

The methodology suggests that the candidate system should carry out realistic tasks to expose the evaluator to as many aspects of the user interface as possible. Some aspects of usability such as inflexibility of a menu structure can only be captured by using the system.

To meet the objective of the Library of providing a good catalogue it requires an interface which promotes interaction and ease of use of the catalog module. The Researcher will define the usability requirements of the cataloguing system interface in broad terms and in relation to the functionality of the second generation online cataloguing systems on the market.

These are:

a. *General Usability Requirements*

- Menu driven
- Reliable
- Good response time. Boss (1993, p.616) suggests a response time of five seconds 95% of the time.

b. Input and Output Communication

The interface should provide easy input and output of the bibliographic records. Matthews (1987) states that the central concept of a computerised catalogue is the display of the bibliographic record. He suggests consistent formats, labelling, brevity of displays and compatibility to group related data. Hancock-Beaulieu (1992) points out that the system should offer greater flexibility at input and output by providing a facilitating opening subsequent menu. She outlines the criteria for interaction. These should be augmented by prompts and screen help messages. System responses and displays should be consistent, brief and compatible to avoid cluttering. Rush (1985,p.84-85) emphasizes the input and output of displays and suggests twenty one type of data displays which an interface should support in a cataloguing system. The movement between functions should be easy.

c. Search Mechanism

The system should have an easy and flexible search mechanism. Hancock-Beaulieu (1992) explains that the key to usability is the reflection of the extent to which it is transparent to the user in terms of search fields, paths and retrieval tools. The interface should be explicit in suggesting alternate references in relation to the results and the initial search. It should support implied 'AND' in search statements to overcome any Boolean system bias of retrieving only the items which match the query exactly. The interface should have retrieval aids to improve recall, such as truncation, automatic spelling error detection and correction and stemming.

d. Search Formulation

The interface should facilitate search formulation. Hancock-Beaulieu (1992) suggests capability for query expansion by adding the title and subject heading terms of records relevant to the user. The system should use the feedback from the user to improve precision. O'Brien (1990) discusses relevancy of retrieved documents in evaluating performance of retrieval systems.

e. Document Representation

The system should have the capability of supporting document representation especially by enhanced subject access.

Detailed evaluation and application of the checklist is provided in Chapter 5.

4.5 Rush Methodology for MARC Support Requirements of a Cataloguing System

The methodology provides a checklist for LC MARC (Library of Congress Machine Readable Cataloguing) field tags and data elements for descriptive and ascriptive bibliographic data it should support. However, it provides these data elements in indivisible form which is not very applicable to the current second generation of online catalogues. The study will therefore adopt a slightly different approach. It will analyse the MARC field tags of the MARC Interface of the Columbia Library System for all the cataloguing data elements the system supports such as authors, subjects, titles, biblio root and local information. This will enable the study to ascertain the extent to which the MARC interface supports the data elements required for effective catalogue creation and maintenance.

To meet the objective of the National Agricultural Library of having a Union Catalogue the desired cataloguing system should support the MARC format. This should have the capability to import, retain and export bibliographic and authority data in MARC format. The system should support original and online cataloguing.

The analysis of the MARC field tags is presented in Chapter 5.

CHAPTER 5

EVALUATION OF THE CATALOG MODULE OF THE COLUMBIA LIBRARY SYSTEM

5.1 Introduction

This chapter covers the actual evaluation of FUNCTIONALITY, USABILITY and MARC support requirements of the Catalog Module of the Columbia Library System version 2.08. The method for the analysis adopts Rush methodology for the 38 functional requirements and for MARC support. Then Ravden and Johnson methodology for the 10 Usability requirements with slight modifications in the layout and phrasing. Rush checklist assigns numerical weights ranging from -5 to 10 to each feature. The study has assigned the same numerical weights to the Ravden & Johnson checklists. Some of the features are designated as 'essential' which means that they are necessary for effective functionality of the system while others are termed as 'critical', implying that they are mandatory for the functioning of the system. On the other hand the weights ranging from -1 to -5 indicate that the system has a feature which discredits it.

Having set the checklists, the evaluation entails operating the Columbia Library System in a simulated library environment and scoring each of its features against the baseline score of the ideal system S1. In an attempt to give a comprehensive and indepth coverage to the features and attributes expected in an acceptable second generation catalogue systems 321 functional and 128 usability features are evaluated. All the checklists take on similar format as Table 5.1.

CHECKLIST NO.: FUNCTION

No.	FEATURES	Weighting		
		Y/N	S1	S2
	Criterion Feature score Cumulative score (b/f) Cumulative score			

Table 5.1 Checklist Format

In the column for Y/N, an entry of ‘Y’ means that the Columbia Library System (CLS) has that particular feature. The column ‘S1’ represents the ideal cataloguing system bearing scores assigned to it by Rush methodology, which have also been adopted for Ravden & Johnson. The weights have a direct bearing to the importance attached to the particular feature in accomplishing the cataloguing functions. Column ‘S2’ represents the Columbia Library System. The evaluation methodology for MARC support lists all the MARC tags supported by the CLS MARC interface against the cataloguing field tags to establish those which are supported.

5.2 Evaluation of the Functional Requirements

The study adopts the Rush checklist as mentioned earlier on the subsequent pages for the detailed analysis and scoring of each feature.

Checklist 1: General Requirements

No.	FEATURES	Weighting		
		Y/N	S1	S2
1	System is command-driven: – User must know commands – User prompted for command	Y Y	1 3	0 3
2	System is menu-driven: – Menus displayed automatically – Menus requested by user – System prompts user action in particular cases	Y Y Y	4 2 3	4 1 3
3	System employs windows	N	3	0
4	Log-on: – User needs to log-on – Log-on is simple and clear	Y Y	2 2	2 2
5	Log-off: – System log-off is easy – System automatically logs-off terminal when default pause lapses with no user activity	Y Y	2 3	2 3
6	System requires user to identify function for entry or modification of data	Y	3	2
7	Moving from function to function is controlled by: – Function keys – Function codes displayed on screen – User keyboard input – Barcoded or OCR function names	Y N Y N	3 2 1 1	1 0 1 1
8	Human System interaction is well-defined, logical and easy to follow	Y	3	2
9	System supports published standards	Y	5	5
10	System supports de facto standards	Y	3	3
11	System collects statistics on all facets of system operation to support report production	Y	5	3
11	Criterion Feature score		51	38

ANALYSIS OF CHECKLIST

To log-on the Columbia Library System is simple and clear. Enter the directory LIBRA and RETURN. The system prompts for the user-name and password. The Catalog module interface is 'menu-driven' which makes it easy to navigate, since the user does not have to memorise the commands. At data entry, when the user completes keying in data for one type of heading and presses RETURN, it automatically displays the screen for the next

heading in the sequence. This continues until data entry for the record is completed unless he interrupts the process. Conversely the interface prompts for user action for menu display, through pull down menu for selection at the CHOICE prompt .

The System facilitates the movement within the function by allowing the use of the arrow keys or entering the highlighted first letter of each option in the function. It supports published standards such as the International Standard Bibliographic Description (ISBD), the Anglo-American Cataloguing Rules (AACR2) and the Machine Readable Cataloguing (MARC). The system produces critical statistical and text reports by default, while others are generated on demand.

CHECKLIST 2: DATABASE ACCESS

No.	FEATURES	Weighting		
		Y/N	S1	S2
1	System supports access to all internal data files:			
	– Cataloguing	Y	6	6
	– Classification schedule	N	4	0
	– Authority	Y	4	4
	– Thesaurus	N	5	0
	– Location and holdings	Y	5	4
	– Union catalogue	Y	3	2
	– Support (Language codes, etc.)	Y	3	3
	– Binding	N	2	0
	– Standards (MARC, AACR2, etc.)	Y	3	3
	– Image	N	2	0
	– Operating performance	Y	3	2
	– Statistics	Y	2	2
	– Physical collection	Y	2	2
	– Transaction	Y	2	2
2	System supports access to available external data files:			
	– Bibliographic data files	Y	3	3
	– Vocabulary control data files	Y	2	2
	– On-line union catalogues	Y	3	2
3	System supports simultaneous access to multiple data bases	Y	3	1
4	System limits access to data bases by:			
	– Authorization	Y	2	2
5	System supports common access for all data bases	Y	4	3
5	Criterion Feature score		63	43
11	Cumulative score (b/f) from checklist 1		51	38
16	Cumulative score		114	81

ANALYSIS OF CHECKLIST 2.

The Catalogue Module supports access to several internal database files such as cataloguing, authority and MARC at data entry and catalogue maintenance. For the integrity of the databases the system limits access by demanding identification from people logging on the system and by restricting the level of access to the different functions and confidential files.

Checklist 3: Search of Data

No.	FEATURES	Weighting		
		Y/ N	S1	S2
1	System supports a variety of search techniques:			
	– Derived search keys: from title ; names ; name/title, etc.	Y	4	4
	– Derived keywords or phrases	Y	5	4
	– Data aggregates (clauses, sentences)	Y	2	2
	– Complete names, titles, subjects, etc.	Y	1	1
	– Assigned identifiers: (e.g. LCCN ; ISSN ; ISBN ; CODEN ; etc.)	Y	4	4
	– Assigned key-terms: (e.g. key title ; call number ; LCSH ; etc.)	Y	3	3
2	System permits use of:			
3	– Boolean operators: AND ; OR ; EXOR ; NOT	Y	3	2
4	– Relational operators: (< ; > ; = ; <= ; >= ; ≠)	Y	3	2
	– Specification ranges for dates, volumes, etc.	Y	2	1
5	System supports:			
	– Implicit truncation: stemming ; or partial string entry	Y	2	2
	– Explicit truncation	Y	3	2
	– Use of search term qualifiers: government publication ; large print ; sound recordings	Y	2	1
6	System limits search by setting “universe” for search performed and data retrieved	Y	3	2
7	System employs stop word list	Y	2	2
	System automatically applies stop word list to search expressions	Y	2	2
	User must apply stop word list to search expression	N	-2	0
8	System supports full range of search commands, requests, and responses	Y	3	2
9	System supports menu-driven searching using:			
	– Fixed menu	N	1	0
	– Flexible menu	Y	3	2
	– User selection of menu level	N	2	0
10	System supports simultaneous searching of multiple data files	Y	3	1
11	System permits searching to be limited to a specific data file or files	Y	3	2
12	System differentiates between searching in different system functions	Y	2	1

13	Search expression input via:			
	– Keyboard	Y	3	3
	– Optical reader: barcode ; OCR	Y	1	1
	– Metallic-dot encoding	N	1	0
	– Menu	Y	2	2
	– Workform (template)	Y	2	1
	– Voice	N	2	0
13	Criterion Feature score		67	51
16	Cumulative score (b/f) from checklist 2		114	81
29	Cumulative score		181	132

ANALYSIS OF CHECKLIST 3.

The Catalogue Module supports flexible menu-driven searching for a variety of search techniques via the keyboard. It is augmented by Boolean operators, relational, range specification and truncation. The System applies the stop word list to search expression automatically.

CHECKLIST 4: RETRIEVAL

No.	FEATURES	Weighting		
		Y/N	S1	S2
1	System supports many data base access points	Y	10	8
2	System retrieves records from multiple files with single search	Y	3	2
3	System provides a variety of retrieval controls	Y	5	4
4	System limits use of controls by authorization	Y	2	2
5	System supports browsing of: <ul style="list-style-type: none">- Index files- Retrieved data item list- Thesaurus or authority list- Classification schedule- Support files	Y Y Y N Y	1 1 1 1 1	1 1 1 0 1
6	System distinguishes automatically between retrieval for copy cataloguing, update, data verification, and other purposes	Y	3	3
6	Criterion Feature score		28	23
29	Cumulative score (b/f) from checklist 3		181	132
35	Cumulative score		209	155

ANALYSIS OF CHECKLIST 4.

The Catalog Module supports several access points such as derived keywords in title, names, subject, classification number, International Standard Book Number (ISBN), Record Sequence Number (RSN) to list a few. It provides a variety of retrieval tools such as search 'qualifiers' and search 'universe' to narrow down retrieved records. It facilitates browsing forward and backward.

CHECKLIST 5: SUPPORT FACILITIES OF RETRIEVAL

No.	FEATURES	Weighting		
		Y/N	S1	S2
1	System permits user to save search expressions	N	3	0
2	System permits user to retrieve and execute saved search expressions	N	3	0
3	System supports down-loading of retrieved data	Y	2	2
4	System permits user to create temporary work file(s)	Y	2	2
5	System permits search of temporary work file(s)	Y	2	2
6	System permits user to specify system device for output	Y	2	2
7	System permits saving report generation specifications	N	3	0
8	System permits retrieval and execution of report generation specifications	N	3	0
9	System limits retrieval of system status information to authorization	Y	1	1
9	Criterion Feature score		20	9
35	Cumulative score (b/f) from checklist 4		209	155
44	Cumulative score		229	164

ANALYSIS OF CHECKLIST 5

The System supports creation of temporary work files through report generation and permits the user to browse them and to specify the output device.

CHECKLIST 6: MARC SUPPORT CAPABILITIES

No.	FEATURES	Weighting		
		Y/N	S1	S2
1	System provides on-line access to MAR record by: - MARC tags ; indicators ; subfield codes ; etc. - Tag and field name - Terms related to standards	Y Y Y	10 2 2	8 2 1
2	System provides examples of usage of MARC: - In user-specified increments	Y	1	1
3	System supports adjacent term display when search term is not in index file	Y	2	2
4	System displays index terms corresponding with an explicitly truncated search term	Y	2	2
5	System supports retrieval qualifiers	Y	3	2
6	System supports retrieval from authority file for validation of names, places, etc.	Y	3	2
7	System permits retrieval to be limited by universe, qualifiers, etc.	Y	3	2
8	Null retrieval produces message	N	2	0
9	Single-record retrieval produces: - Abbreviated record transferred to transaction record for request entry - Brief record for other purposes - Full record on request for review/verification	N Y Y	4 2 2	0 1 2
10	Multiple-record retrieval produces: - Initial count of hits - Initial list of truncated entries - Initial list of compressed entries - Subsequent list of partial records initial hits - Subsequent list of partial records from compressed entry of previous retrieval list - Full record from a truncated entry from previous retrieval list	Y N N N N Y	2 1 1 1 1 1	2 0 0 0 0 1
11	System carries most recently retrieved record from function to function unless cancelled	Y	2	2
12	System identifies relationships between MARC and other standards, including: - AACR2 - ISBD - UNIMARC - COSATI	Y Y N N	3 2 2 1	3 2 0 0
13	System enables cataloguer to select indicator and subfield codes at cataloguing	Y	3	
14	System provides for selection of specific fixed-length data element values for transferring to cataloguing record	Y	3	2
15	System provides for update and maintenance of the MARC data file	Y	4	4
15	Criterion Feature score		66	41
44	Cumulative score (b/f) from checklist 5		229	164
59	Cumulative score		295	205

ANALYSIS OF CHECKLIST 6

The Catalog Module has MARC Support capabilities. The MARC interface supports several commonly used vendor MARC formats and bibliographic utilities. It enables the user to edit the copy of any of these formats through the table editor to tailor them local needs and to include non-standard MARC fields for local information such as call numbers, codes, etc. The MARC interface facilitates the user to download bibliographic records from commercial vendors and to exchange records between union site and locations.

CHECKLIST 7: CATALOGUING DATA ENTRY

No.	FEATURES	Weighting		
		Y/N	S1	S2
1	System supports: <ul style="list-style-type: none"> On-line interactive creation of cataloguing records Non-redundant data entry MARC data entry Non-MARC data entry 	Y Y Y Y	10 10 8 1	10 8 7 1
2	System distinguishes levels of completeness of catalogue records	Y	3	2
3	System provides entry of ascriptive and descriptive bibliographic ; location ; holdings ; and related data via: <ul style="list-style-type: none"> Keyboard Mouse Optical character scanner Wand reader Voice input Automatic transfer from other systems 	Y N N N N Y	3 1 4 2 3 2	3 0 0 0 0 1
4	System provides for simultaneous update of local and union bibliographic data files through single cataloguing effort	Y	3	3
5	System supports a variety of function keys to minimize data entry effort	N	5	0
6	System permits cataloguer to create a new bibliographic record from a copy of a related existing record	Y	3	3
7	System supports data entry through use of: <ul style="list-style-type: none"> Structured work forms Prompts Provisional records entered through optical scanning MARC support files Unguided input 	Y Y N Y N	2 2 2 1 -2	2 2 0 1 0
8	Systems supports entry of bibliographic data in vernacular scripts: <ul style="list-style-type: none"> Roman alphabet (extended) Arabic alphabet Chinese ideograms Cyrillic alphabet Gaelic alphabet Greek alphabet Hebrew alphabet Sanskrit alphabet 	Y Y N N N N N N	2 1 1 1 1 1 1 1	2 1 0 0 0 0 0 0
9	System displays vernacular text in accepted reading order	Y	2	2
10	System automatically supplies set default values: <ul style="list-style-type: none"> Date and time of record creation Cataloguer identity Workstation ID Work tracking data (via wand reader) 	Y Y Y N	1 1 1 1	1 1 1 0
11	System limits data entry by authorization	Y	3	3
12	System maintains data entry audit trail	Y	5	5
12	Criterion Feature score		86	59
59	Cumulative score (b/f) from checklist 6		295	205
71	Cumulative score		381	264

ANALYSIS OF CHECKLIST 7

The System supports entry of ascriptive and descriptive bibliographic data via keyboard and MARC format loading . It facilities the in-put by provision of structured work templates and prompts.

CHECKLIST 8: VERIFICATION & VALIDATION OF RECORD STRUCTURE

No.	FEATURES	Weighting		
		Y/N	S1	S2
1	System automatically verifies and validates structure of each type of record maintained	Y	10	10
2	System computes field and record lengths	Y	3	3
3	System controls fields: <ul style="list-style-type: none">– Maximum number of occurrences of each field per record– Maximum field and record lengths– Repeatability of fields and subfields	Y Y Y	3 3 3	3 3 3
4	System verifies presence of all required record segments	Y	3	1
5	System controls fields and subfields sequence in a record	Y	2	2
6	User cannot override system-controlled record structure	Y	3	3
6	Criterion Feature score		30	28
71	Cumulative score (b/f) from checklist 7		381	264
77	Cumulative score		411	292

ANALYSIS OF CHECKLIST 8

The System automatically verifies and validates the structure of each record, to ensure that it conforms to the ISBD and AACR2. For integrity, the user cannot override the structure.

CHECKLIST 9: DATA ELEMENT IDENTIFIER VERIFICATION

No.	FEATURES	Weighting		
		Y/N	S1	S2
1	System supplies data element identifiers ; tags ; subfield codes ; etc.	Y	5	5
2	System verifies all input data element identifiers	Y	4	4
3	System displays error messages for incorrect identifiers	Y	3	3
4	System prompts for correct data when an error is made	Y	2	2
5	System provides for facile maintenance of data element identifier tables	Y	3	2
5	Criterion Feature score		17	16
77	Cumulative score (b/f) from checklist 8		411	292
82	Cumulative score		428	308

ANALYSIS OF CHECKLIST 9

To ensure consistency and accuracy the system verifies all input data element identifiers and displays error message for an incorrect one.

CHECKLIST 10: INTERNAL CONSISTENCY VERIFICATION & VALIDATION

No.	FEATURES	Weighting		
		Y/N	S1	S2
1	System verifies internal consistency of a record by: - Self consistency - Cross consistency	Y Y	5 5	5 5
2	System verifies consistency in related records	Y	10	8
3	System insures consistency of data element identifiers for each type of material	Y	3	3
4	System uses vocabulary control to ensure consistency	Y	2	2
4	Criterion Feature score		25	23
82	Cumulative score (b/f) from checklist 9		428	308
86	Cumulative score		453	331

ANALYSIS OF CHECKLIST 10

The System augments the direct verification and validation to ensure internal consistency. To achieve this it examines data element identifiers and data element values for data entered into any record structure.

CHECKLIST 11: SPELLING ERROR DETECTION & CORRECTION

No.	FEATURES	Weighting		
		Y/N	S1	S2
1	System supports spelling error detection	N	10	0
2	System employs a dictionary of:			
	– 20,000 words	N	1	0
	– 50,000 words	N	3	0
	– 100,000 words	N	5	0
3	System checks for spelling errors as:			
	– Words are entered	N	2	0
	– Fields are entered	N	4	0
	– Record is completed	N	3	0
4	System corrects spelling errors automatically	N	3	0
5	System displays options for correct spelling	N	2	0
6	System highlights incorrect word but does not suggest corrections	N	1	0
7	System permits user additions to the spelling dictionary	N	2	0
8	System uses windows to display spelling options	N	2	0
9	System maintains audit trail of spelling transactions	N	1	0
9	Criterion Feature score		39	0
86	Cumulative score (b/f) from checklist 10		453	331
95	Cumulative score		492	331

ANALYSIS OF CHECKLIST 11

The system has no provision for spelling error detection and conversely for correction. This is a strong weakness because if a spelling error is not detected by the catalogue wrong entries are likely to be made.

CHECKLIST 12: IDENTIFICATION NUMBER VALIDATION

No.	FEATURES	Weighting		
		Y/N	S1	S2
1	System supports validation of identification numbers: <ul style="list-style-type: none">- ISBN- ISSN- STRN- CODEN- ISRN- ISFN- Item identification numbers- Record control numbers	Y Y N Y N N Y Y	3 3 2 3 2 2 3 4	3 3 0 3 0 0 3 4
2	System records incorrect numbers in special subfield unless overridden	Y	3	3
3	System issues warning message to user when invalid number is input	Y	2	2
4	System permits use of invalid numbers as retrieval access points	Y	3	1
4	Criterion Feature score		30	22
95	Cumulative score (b/f) from checklist 11		492	331
99	Cumulative score		52	353

ANALYSIS OF CHECKLIST 12

The system does not support validation of identification numbers, since all identification it maintains is stored in the Biblio root template which is not subject to authority control. However, it assigns record control number automatically.

CHECKLIST 13: VOCABULARY CONTROL

No.	FEATURES	Weighting		
		Y/N	S1	S2
1	System supports creation and maintenance of vocabulary control devices: a) Authority files of: – Subjects – Names – Geographical – Titles b) Tables of standard codes and values: language codes ; names ; geographic areas & frequencies c) Thesauri of: – Names – Subjects – General	Y Y Y Y Y N N N	3 3 2 2 3 4 4 5	3 3 2 2 3 0 0 0
2	System permits adoption and use of vocabulary control files from external sources	Y	3	3
3	Vocabulary control devices provide for the following relationships: – Equivalence (see/use, SY) – Generic/specific (BT, NT) – Part/whole (see also, RT, PW/WP) – Difference (see also, RT, DR) – Symbiotic (SR, PR, PS) – Intentional (scope note, SN)	Y Y Y Y Y Y	2 2 2 2 2 2	2 2 2 2 2 2
4	System employs vocabulary control to ensure consistency of data within and among bibliographic records	Y	5	4
5	System applies vocabulary control: – Automatically upon entry or update of a data field – Automatically upon completion of record – Upon command of cataloguer – In batch mode on a daily (or similar) basis	Y Y N N	5 4 3 2	5 4 0 0
6	Cataloguer search vocabulary control files and verify data manually	N	-3	0
7	System matches valid data in vocabulary control file against bibliographic record	Y	3	3
8	System employs concept of preferred or authoritative term	Y	1	1
9	System employs concept of "anchor" term in building synthetic structures	Y	2	2
10	System stores controlled terms in: – Bibliographic records – Vocabulary records with dual pointers between Bibliographic and vocabulary records	N Y	1 4	1 4
11	System permits global changes of vocabulary terms	Y	3	3
12	System enables change in relationship between bibliographic records and vocabulary terms	Y	2	2
13	System permits browsing in vocabulary control file	Y	2	2
14	System capable of displaying term relationship maps	N	2	0
15	System provides convenient update and maintenance of vocabulary control file	Y	5	5

16	System provides update of vocabulary control file only under authorization	Y	3	3
17	System provides creation of provisional vocabulary record	Y	3	2
18	System permits provisional addition of terms to vocabulary record	Y	3	2
19	System converts provisional records to accepted records within 1 week of original entry	Y	2	1
20	System maintains audit trail of all vocabulary control transactions	Y	3	3
20	Criterion Feature score		96	75
99	Cumulative score (b/f) from checklist 12		522	353
119	Cumulative score		618	428

ANALYSIS OF CHECKLIST 13

The Cataloguing system supports comprehensive vocabulary control through application of vocabulary control devices specifically the authority files of Names, Subjects and Titles. It also deploys cross-referencing of these headings through 'See' and 'See Also' references. The system employs 'global changes' to used headings in the authority files. Although the facility allows the user to effect changes in used headings at a go it should be used cautiously because it can produce erroneous citations.

CHECKLIST 14: FORMAT, PUNCTUATION, SPACING & CAPITALIZATION CONTROL

No.	FEATURES	Weighting		
		Y/N	S1	S2
1	System automatically supplies record format and punctuation	Y	4	4
2	System supplies punctuation in proper format for all identification numbers (e.g. ISBN)	N	3	0
3	System automatically formats all data fields	Y	2	2
4	System automatically adjusts spacing to conform to standards	Y	2	2
5	System verifies or corrects capitalization	N	4	0
6	System requires above tasks to be performed manually	N	-5	0
6	Criterion Feature score		10	8
119	Cumulative score (b/f) from checklist 13		618	428
125	Cumulative score		628	436

ANALYSIS OF CHECKLIST 14.

The system conforms automatically to International Standard Bibliographic Description (ISBD) punctuation, field formats, and spacing. However, it does not provide punctuation to the International Standard Book Number (ISBN). It neither verifies nor corrects capitalization.

CHECKLIST 15: REDUNDANCY ELIMINATION

No.	FEATURES	Weighting		
		Y/N	S1	S2
1	System minimizes redundant storage of data	Y	10	9
2	System capable of supplying text for coded data	Y	5	4
3	System capable of supplying "redundant" data	Y	3	2
4	System detects duplicate data entered into a:			
	- field	Y	3	3
	- record	Y	3	3
	- file	Y	3	3
5	System eliminates duplicate data	Y	4	3
5	Criterion Feature score		31	27
125	Cumulative score (b/f) from checklist 14		628	436
130	Cumulative score		659	463

ANALYSIS OF CHECKLIST 15.

The system minimizes redundant data entry storage through validation. This facility enables you to compare the new entry with an existing one to show any difference if any. However, redundancy elimination calls upon the effort of the cataloguer. The comparison is an intellectual component which requires experience and patience of the cataloguer.

CHECKLIST 16: ENRICHMENT OF SUBJECT & CONTENT DATA

No.	FEATURES	Weighting		
		Y/N	S1	S2
1	System supports local augmentation of subject heading authorities with: - Additional headings - Terms of greater specificity	Y Y	3 5	3 5
2	System permits expanded use of classification schedules by: - Accepting class terms as subject terms, rather than as locator terms - Permitting coordination of class terms - Displaying classification schedule for cataloguer browsing - Displaying text equivalent of class code	Y Y N Y	6 5 3 3	6 5 0 3
3	System coordinates subject heading and class terms for maximum breadth and depth of coverage	Y	4	4
4	System permits derivation of subject terms from work catalogued	Y	5	5
5	System exercises vocabulary control over derived subject terms	Y	4	4
7	System requires subject indexing and classification of all works catalogued	Y	4	3
	System permits override of required subject indexing and classification under authorization	Y	2	2
7	Criterion Feature score		44	40
130	Cumulative score (b/f) from checklist 15		659	463
137	Cumulative score		703	503

ANALYSIS OF CHECKLIST 16.

The system supports subject enrichment through classification numbers, derived title keywords, and notes. The system does not demand subject indexing or classification of all the works catalogued. Any field can be left empty. Some fields should be mandatory such as author, ISBN and title, but with flexibility of permitting the user to override the requirement as need be.

CHECKLIST 17: ITEM IDENTIFICATION

No.	FEATURES	Weighting		
		Y/N	S1	S2
1	System employs machine-readable item identification numbers (IIN) to identify individual bibliographic items	Y	5	3
2	IIN are readable by: <ul style="list-style-type: none"> – Wand reader on terminal – Stand-alone laser reader – Stationary metallic-dot reader 	Y N N	2 2 2	1 0 0
3	IIN are usable in other library applications such as serials control, circulation control	Y	2	2
4	Pre-printed or prepared IIN labels are used:	Y	3	2
5	System prints IIN labels: <ul style="list-style-type: none"> – In batch – On demand 	Y Y	1 2	1 2
6	System supports other item identification numbers: <ul style="list-style-type: none"> – Network control number – Local system number – SuDocs number – Call number – Accession number – ISBN – ISSN – CODEN – STRN (standard technical report number) – Standard recording number (ISRN) 	Y Y N Y Y Y Y Y N Y	1 1 1 1 1 1 1 1 1 1	1 1 0 1 1 1 1 1 0 1
6	Criterion Feature score		29	19
137	Cumulative score (b/f) from checklist 16		703	503
143	Cumulative score		732	522

ANALYSIS OF CHECKLIST 17.

The system supports barcodes for title identification. The system supports item identification through several devices. These include among others Record Sequence Number (RSN) which it assigns automatically as a new record is created. This RSN can be modified to the local needs. The system supports ISBN, ISSN, CODEN and Call Numbers.

CHECKLIST 18: SHELF LISTING AND RANGING

No.	FEATURES	Weighting		
		Y/N	S1	S2
1	System maintains shelflist through: - Call number index - Accession number index - Special shelflist file	Y Y N	5 5 -2	5 5 0
2	System automatically determines shelf location relative to other works in the collection and assigns locator	N	4	0
3	System maintains a file containing an inventory of storage facilities: shelves ; drawers ; etc.	N	3	0
4	System provides for unique identification number (SLIN) for each storage unit shelf, drawer, etc.	N	3	0
5	System records first and last locator numbers (call numbers, accession numbers) for items in each storage unit	N	3	0
6	System automatically determines amount of storage space consumed by each item catalogued	N	3	0
7	System provides alert when available storage space on a unit falls below some preset threshold	N	3	0
8	System provides display of used and available storage space by unit	N	2	0
9	System maintains record of space utilization for items temporarily out of storage	N	3	0
10	System provides reports of storage space utilization	N	2	0
10	Criterion Feature score		34	10
143	Cumulative score (b/f) from checklist 17		732	522
153	Cumulative score		766	532

ANALYSIS OF CHECKLIST 18.

The Cataloguing system achieves shelf listing through call number index and accession number index. The latter is derived from the Record Sequence Number. However it does not support shelf ranging.

CHECKLIST 19: DOCUMENTATION

No.	FEATURES	Weighting		
		Y/N	S1	S2
1	Quick reference guide provided	N	4	0
2	Quick reference material keyed to full user documentation	N	2	0
3	User (functional) documentation for staff	Y	4	4
4	Documentation well indexed	Y	3	2
5	Documentation includes ample illustrations and examples	Y	3	2
6	Documentation includes sample workflows and procedures	Y	3	2
7	System (application) documentation supplied	Y	4	3
8	Application environment documentation	Y	3	2
9	Database documentation	Y	4	3
10	Data element dictionary	Y	3	2
11	Error messages and meanings	Y	3	2
12	System operator documentation:			
	- System installation	Y	2	2
	- System start-up	Y	3	3
	- Data base creation	Y	2	2
	- Data base back-up	Y	3	3
	- System shut-down	Y	2	1
	- Batch operation	Y	2	1
	- Recovery/restart procedures	Y	2	1
13	System trouble-shooting documentation	N	2	0
14	Documentation maintained in machine-readable form	N	2	0
	Documentation kept current by system vendor	Y	3	3
15	Documentation of hardware and software (technical level) maintained in escrow by vendor for benefit of library customers	N	3	0
15	Criterion Feature score		62	38
153	Cumulative score (b/f) from checklist 18		766	532
169	Cumulative score		828	570

ANALYSIS OF CHECKLIST 19.

System application documentation is provided and the vendor updates it regularly. Quick reference and user manual are lacking. The vendor should supply them because the application manual is too bulky and it cannot be readily used.

CHECKLIST 20: PHYSICAL PREPARATION

No.	FEATURES	Weighting		
		Y/N	S1	S2
1	System accepts machine-readable item identifier: (Barcode ; OCR or metallic dot)	Y	5	4
2	System produces machine-readable item identifier labels (barcode, OCR)	Y	1	1
3	System uses preprinted labels	Y	3	2
4	System prints call number or accession number labels for unbound items	Y	3	3
5	System prints call number or accession number labels for bound items	Y	3	3
6	System produces shelving labels other than from call number or accession number	N	3	0
7	System produces SLIN labels for shelves, other storage locations	N	2	0
8	System prompts for insertion of security devices in items	Y	2	2
8	Criterion Feature score		22	15
169	Cumulative score (b/f) from checklist 19		828	570
177	Cumulative score		850	585

ANALYSIS OF CHECKLIST 20.

The system produces shelving labels only from call numbers. It accepts machine readable identifiers, the Barcodes.

CHECKLIST 21: AUDIT TRAIL

No.	FEATURES	Weighting		
		Y/N	S1	S2
1	System maintains audit trail for all transactions that affect integrity of the data base	Y	3	3
2	System maintains audit trail for all transactions that relate to access to data base	Y	2	1
3	System maintains audit trail for all system maintenance and repair work	N	3	0
4	System maintains audit trail of all override activity	N	3	0
5	System supports on-line, read-only access to audit trail data on authorization	Y	2	2
6	Audit trail maintained in machine-readable form	Y	3	3
7	Audit trail not alterable	Y	4	4
8	Audit trail records identify: <ul style="list-style-type: none"> - Person effecting transaction - Function/feature performed or attempted - Date - Time - Transaction data - Terminal used - Telecommunication line used - Library - Library unit 	N Y Y Y Y Y N Y Y	1 2 2 2 1 2 1 1 1	0 2 2 2 1 2 0 1 1
9	System supports analysis of audit trail data to determine: <ul style="list-style-type: none"> - Staff performance - Cataloguing system vendor performance in maintenance and repair - Nature of materials catalogued - File update activity - Vocabulary control activity - Spelling error levels - Subject term usage (number and kind) - Error correction after completion of cataloguing - Potential security violations - Override activity 	Y N Y Y Y N Y N N N	1 1 1 1 1 1 1 1 1 1	1 0 1 1 1 0 1 0 0 0
10	System supports production of a variety of reports based on audit trail data	Y	3	3
10	Criterion Feature score		46	32
177	Cumulative score (b/f) from checklist 20		850	585
187	Cumulative score		896	617

ANALYSIS OF CHECKLIST 21

The system supports production of a variety of reports by default based on audit trail data. The reports include statistical and text. The Catalog statistical reports include catalogue editing count, title count for all records, and title count by RSN and date range. They enable the user to monitor title activities. The authority reports provide information on the used headings and the relational links by 'See' and 'See Also' references.

CHECKLIST 22: DISPLAYS OF MESSAGE, ETC.

No.	FEATURES	Weighting		
		Y/N	S1	S2
1	System displays messages: <ul style="list-style-type: none"> – Log-on and log-off – Error messages – Exceptional conditions – Information messages – Instructional (help) messages 	Y Y Y Y Y	1 2 1 1 1	1 2 1 1 1
2	System supports data displays of varying content: <ul style="list-style-type: none"> – Policy data – Bibliographic data – Holdings and location – Shelflist – Standards data – MARC data – Support data (codes, etc.) – Data comparison – Transaction data – Status data – Notice data – Report – Report generation – Classification schedule – Vocabulary control data – Term relationship – Spelling error* – Browse mode – Name and address data (publishers) – Statistical data – Routing data – Routing list – System table – Adjacent term 	Y Y Y Y Y Y Y Y Y Y Y N Y Y N Y Y N Y Y Y N N Y Y Y	4 5 4 3 2 3 2 3 2 1 1 1 3 2 3 5 3 2 2 2 2 1 1 3 2 1	3 5 4 3 2 3 2 3 2 1 0 3 2 0 5 3 -2* 2 2 2 0 0 3 1 1
3	System supports several forms of display: <ul style="list-style-type: none"> – Count of retrieved items – Compressed entry – Truncated entry – Abbreviated entry – Copy tabulation – Full record 	Y N Y Y N Y	1 1 1 1 1 1	1 0 1 1 0 1
4	System provides workforms or templates for data entry of: <ul style="list-style-type: none"> – Bibliographic data – Routing data – Vocabulary data – Name/address – System table – Report generation 	Y N Y Y Y Y	2 2 1 2 3 1	2 0 1 2 3 1
5	Systems supports various data representations in displays: coded data ; abbreviations ; transliterations ; vernacular scripts	Y	3	2
6	System provides a variety of display formats list ; paragraphed ; tabular	Y	2	2

7	Systems provides various orderings of records and data elements in displays by: title ; name ; subject ; etc.	Y	2	2
8	System supports intelligent terminals	N	3	0
9	System supports microcomputer workstations	Y	4	4
10	System supports workstation printers	Y	2	2
10	Criterion Feature score		99	80
187	Cumulative score (b/f) from checklist 21		896	617
197	Cumulative score		995	697

ANALYSIS OF CHECKLIST 22.

The system supports the display of a variety of messages to facilitate cataloguing activities. It also supports display of a range of data in various formats. However, it does not support spelling error detection and it has a negative score for this feature.

CHECKLIST 23: PRINTED OUTPUT

No.	FEATURES	Weighting		
		Y/N	S1	S2
1	System supports printing at workstations of: <ul style="list-style-type: none"> – Storage location identification number labels – Spine, pocket and labels, and catalogue cards – Routing slips – Notices on demand – Various data displays for off-line use, checking and/or verification – Machine-readable identifier labels – Special reports – Shelving slips 	N Y N N Y Y Y N	3 4 2 2 1 1 2 1	0 4 0 0 1 1 2 0
2	System supports a variety of printing devices	Y	2	1
2	Criterion Feature score		18	9
197	Cumulative score (b/f) from checklist 22		995	697
199	Cumulative score		1013	706

ANALYSIS OF CHECKLIST 23.

The system has the capability to print spine and pocket labels and catalogue cards by RSN range or location. It allows the user to customise the card formats by editing table 901, while that for spine and pocket labels is done through initialization. The printing can be accomplished from Files/DOS Option and Printing Cards and Spine Labels Option. The system is configured for Dot Matrix .

CHECKLIST 24: ACCESS CONTROL

No.	FEATURES	Weighting		
		Y/N	S1	S2
1	Prevents unauthorized: – Access to any system function, feature or data – Changes or deletions of data – Down-loading or transfer of data	Y Y Y	5 5 4	5 5 4
2	Differentiates between levels of staff	Y	5	5
3	Distinguishes staff from patrons	Y	5	5
4	Distinguishes system operators	Y	3	3
5	System identifies and controls vendor access	Y	4	3
6	Achieves access control by: – System-assigned user identification number – System-assigned password – User-assigned password – Combination of system-assigned identification number and user-assigned password Random reassignment or invalidation of authorization numbers and passwords – Function-level identification number or password – Terminal level control by: • group • terminal – Task/activity level – Transaction level – Does not display access codes	Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y	1 1 1 2 2 1 1 1 1 1 1 2 2 2 2 2 2	1 1 1 2 2 1 1 1 1 1 1 2 2 2 2 2 2
7	Data base integrity insured	Y	2	2
8	System maintains audit trail of all access control activity	N	3	0
8	Criterion Feature score		51	47
208	Cumulative score (b/f) from checklist 23		1013	706
216	Cumulative score		1064	753

ANALYSIS OF CHECKLIST 24.

To ensure data base integrity the System controls access to all system functions by demanding for identification through “IDs” from people logging on to the system. The user profile consists of three parts USERNAME, PASSWORD and SECURITY LEVEL numbers The system does not maintain audit trail for all the access control activity however, it is necessary to keep track of any attempts to override the security system.

CHECKLIST 25: OVERRIDES

No.	FEATURES	Weighting		
		Y/N	S1	S2
1	System supports override of automatic features: <ul style="list-style-type: none">- Default values for data elements- Limit on number of fields of a particular type- Automatic routing- Material-type restrictions- Item restrictions- Limit on proportion of used and unused storage space to maintain- Limit on creation of new vocabulary terms- Workstation processing time limits	Y Y N N N N Y N	3 2 2 1 1 2 2 1	3 2 0 0 0 0 2 0
2	System supports override of defaults or system table values	Y	3	3
3	System controls overrides by level of access control via audit trail	N	4	0
4	System limits frequency and quantity of any override	Y	3	2
5	System monitors and reports all override activity	N	3	0
5	Criterion Feature score		27	12
216	Cumulative score (b/f) from checklist 24		1064	753
221	Cumulative score		1091	765

ANALYSIS OF CHECKLIST 25.

The system supports a few of the default settings to be overridden with the appropriate level of authorization.

CHECKLIST 26: DEFAULTS

No.	FEATURES	Weighting		
		Y/N	S1	S2
1	System supports default value for function selected (e.g. date entry)	Y	3	3
2	System supports default file to access (e.g. cataloguing data file)	Y	3	3
3	System provides default access control level (e.g. search only)	Y	2	2
4	System provides default tags, indicators, and subfield codes based on: - Material type - Type of record - Bibliographic level	Y Y Y	1 1 1	1 1 1
5	System sets default anchor term on creation of a new vocabulary control record	Y	2	2
6	System supports default values for various data elements in data entry, update and conversion	Y	2	2
7	System cross-checks default values with newly entered data for validity	Y	3	3
8	System permits data carry-over from record to record for repetitive data entry	Y	2	2
9	System supports default for number of overrides permitted per staff member per unit of time	N	2	0
10	Default values are accessible on-line for inspection and modification by staff under suitable authorization	Y	3	2
10	Criterion Feature score		25	22
221	Cumulative score (b/f) from checklist 25		1091	765
231	Cumulative score		1116	787

ANALYSIS OF CHECKLIST 26.

For ease of use and standardization the system supports several default settings for cataloguing and supportive activities. It keeps all the default settings, it only allows the user to make any modification to a copy, such as the MARC tags which can be edited from a copy and the changed format maintained. It offers only temporary changes to defaults of report formats. The exception to this is the for screen messages.

CHECKLIST 27: MESSAGING

No.	FEATURES	Weighting		
		Y/N	S1	S2
1	Intrasystem messaging supported:			
	– Terminal to terminal	Y	2	1
	– Terminal to terminal group	Y	2	1
	– Terminal to all terminals	Y	2	1
	– Terminal to person	Y	2	1
2	Intersystem messaging supported	Y	2	2
3	Alert of messages pending is not pre-emptive	Y	1	1
4	Pre-emptive messages permitted under authorization	Y	1	1
5	System does not maintain record of messages	Y	2	2
6	Message retrieval is destructive (i.e., message lost after retrieval)	Y	2	1
7	Messages purged from system after 24 hours	Y	1	1
8	System supports messages of up to 200 characters	Y	1	1
9	System supports messages of more than 200 characters	N	-2	0
9	Criterion Feature score		16	13
231	Cumulative score (b/f) from checklist 26		1116	787
240	Cumulative score		1132	800

ANALYSIS OF CHECKLIST 27.

The system permits intrasystem and intersystem messaging. The messages are brief and after retrieval they are lost to create space.

CHECKLIST 28: HELP

No.	FEATURES	Weighting		
		Y/N	S1	S2
1	System supports on-line assistance for users	Y	4	3
2	System permits user to set level of "help"	Y	3	1
3	System provides: <ul style="list-style-type: none">– Informative messages in response to correctly executed transactions– Clear set of error messages to a mistake– Messages indicating both the occurrence and nature of exceptional conditions– Comprehensive set of instructional messages to facilitate its use	Y Y Y Y	4 4 4 4	4 4 4 2
4	Instructional messages accessible without interruption of work in progress	Y	3	3
5	Instructional messages or tracts on commands, requests, functions, errors, etc., available through use of "help" or similar command	Y	4	3
6	Help messages displayed via windows	Y	2	1
7	Help messages displayed via voice	N	2	0
7	Criterion Feature score		34	25
246	Cumulative score (b/f) from checklist 27		1132	800
253	Cumulative score		1166	825

ANALYSIS OF CHECKLIST 28.

The system provides informative and instructional HELP messages, but the latter is inadequate. In many cases the user has to refer to the manual. The HELP message that is displayed when the user presses F1 key is a duplicate of what is already on the screen, except that it is displayed in a different colour. For novice help, the user presses Ctrl - F1.

CHECKLIST 29: REPORTS

No.	FEATURES	Weighting		
		Y/N	S1	S2
1	ON-line report generation:			
	- On-demand	Y	2	2
	- Pre-programmed	Y	2	2
2	Batch report generation:			
	- On-demand	Y	2	2
	- Pre-programmed	Y	2	2
3	Daily or weekly activity reports for:			
	- Items: • received	Y	1	1
	• catalogued	Y	1	1
	• physically processed	Y	1	1
	• held due to problems	N	1	0
	• shelved	N	1	0
	• overdue in cataloguing	N	1	0
	• overdue in physical processing	N	1	0
	- Vocabulary control records created	Y	1	1
	- Audit trail summary	Y	1	1
4	Daily or weekly exception reports produced:			
	- Items overdue at any workstation since last report	N	1	1
		N	1	0
	- Data entry errors, by type	Y	1	1
	- Controlled terms not found in vocabulary control file	N	1	0
	- Items not subject catalogued or classified	N	1	0
	- Audit trail exceptions	N	1	0
	- Summary of overrides	N	1	0
	- Attempted access control violations	N	1	0
5	Activity data reports:			
	- Searches, by type	Y	1	1
	- Bibliographic records updated	Y	1	1
	- Vocabulary control records updated	Y	1	1
	- Items catalogued per staff member	Y	1	1
	- Items catalogued by class	Y	1	1
	- Items catalogued by type	Y	1	1
	- Items catalogued by form	Y	1	1
	- Items catalogued by source	Y	1	1
	- New vocabulary control terms approved	Y	1	1
6	Routing list for informational and maintenance purposes by:	N	1	0
	- Organizational unit	N	1	0
	- Position	N	1	0
	- Individual	N	1	0
	- Security classification	N	1	0
	- Title			

7	Data base statistics for:			
	– Number of:			
	• bibliographic records	Y	1	1
	• vocabulary control records	Y	1	1
	• other records	Y	1	1
	• index entries by type	N	1	0
	• bibliographic, location and holding, vocabulary,	N	1	0
	• bibliographic records per vocabulary record	N	1	0
	• vocabulary records per bibliographic record	N	1	0
	– Record length	N	1	0
	– Data base activity quantities	Y	1	1
8	System performance data:			
	– Active terminals per time period	Y	1	1
	– Response time for each type of basic function	N	1	0
	– Data base accesses	N	1	0
9	Work tracking report	Y	3	2
9	Criterion Feature score		53	30
253	Cumulative score (b/f) from checklist 28		1166	825
262	Cumulative score		1219	855

ANALYSIS OF CHECKLIST 29.

The system supports the production of catalogue reports by default to audit trail the critical functions to cataloguing. The statistical reports indicate the number of titles that have been edited, the total number of titles held in the database or titles by Record Sequence Number (RSN) or date range. The text reports facilitate the user to list titles in short form by medium (Field 66) or location. They can be sorted on Classmark, Title or Field 66.

In addition, the system supports the production of authority reports by default. The user can produce reports by 'authority Names' 'authority Titles', and authority subjects. Consequently, the user is able to produce 'See', 'See also' and 'Used Heading' reports to enable him to establish new headings and cross references added to the database. The system allows the user to print the accessions lists, and indexes of the used headings.

CHECKLIST 30: REPORT GENERATOR

No.	FEATURES	Weighting		
		Y/N	S1	S2
1	System provides a wide range of choices of report formatting options: <ul style="list-style-type: none"> - Tabular - Column - Number of lines per page - Number of significant digits - Paragraph indentation - Page headers and footers - Footnotes - Underscoring - Overstriking 	N Y Y N Y N N N N	2 2 1 1 1 1 1 1 1	0 2 1 0 1 0 0 0 0
2	Sorting capability at three levels	Y	3	3
3	System allows for specification of the data content of a report, including: <ul style="list-style-type: none"> - Choice of : <ul style="list-style-type: none"> • title • column headings • data elements • row labels - Content of headers and footers - Automatic or forced pagination 	N N N N N N	1 1 1 1 1 1	0 0 0 0 0 0
4	System provides a wide variety of data manipulation capabilities: <ul style="list-style-type: none"> - Choice of mathematical and statistical operations: <ul style="list-style-type: none"> • sums • differences • means • maxima • minima • mode • cross correlation • other selected statistical functions 	Y Y N Y Y N Y N	1 1 1 1 1 1 1 1	1 1 0 1 1 0 1 0
5	System supports flexible output modes: <ul style="list-style-type: none"> - Graphics output - Printed output - Video output - Voice output - Colour, intensity, reverse imaging - Machine-readable output: magnetic tape: MARC 	N Y Y N Y Y	2 1 1 1 1 1	0 1 1 0 1 1
6	System saves: <ul style="list-style-type: none"> - Report specifications - Generated reports 	N N	2 2	0 0
6	Criterion Feature score		41	15
262	Cumulative score (b/f) from checklist 29		1219	855
268	Cumulative score		1260	870

ANALYSIS OF CHECKLIST 30

The system allows to generate different report formats to meet the local needs. However, the system does not save the generated reports. reports are produced under three options: UTILITY, FILE/DOS and AUTHORITY CONTROL, which is confusing. It would be better if all reports can be accessed under one option.

CHECKLIST 31: DATA UPDATE & CONVERSION

No.	FEATURES	Weighting		
		Y/N	S1	S2
1	Data update and conversion modes supported:	Y	3	3
		Y	1	1
	System supports data base update:	Y	2	2
		Y	2	2
		Y	2	2
		Y	2	2
2	System supports record update:	Y	2	2
		Y	2	2
		Y	2	2
		Y	2	2
3	System supports record update at:	Y	2	2
		Y	1	1
4	System provides record locking under update	Y	3	3
5	System provides immediate access to all newly entered/updated records	Y	5	5
6	System supports:	Y	2	2
		Y	2	2
7	Input vehicles supported:	Y	2	2
		Y	2	2
		N	2	0
		N	2	0
		N	1	0
		Y	1	1
		N	1	0
8	System performs error checking for:	Y	1	1
		Y	1	1
		Y	1	1
		Y	1	1
		Y	2	2
		Y	2	2
		Y	2	2
9	Conversion of data records to required system format from:	Y	4	4
		Y	4	3
		Y	3	3
		Y	3	3
		Y	3	3
10	Conversion of MARC records is reversible	Y	4	3
11	Transactions journalised to provide for back-up and recovery	Y	4	4
12	System provides audit trail for all affective data base transactions	Y	4	3
12	Criterion Feature score		78	69
268	Cumulative score (b/f) from checklist 30		1260	870
280	Cumulative score		1338	939

ANALYSIS OF CHECKLIST 31.

The system supports data update at data element and field level in 'real time'. It also permits the import and export of records in Machine Readable Catalog from several bibliographic utilities. It converts catalogued records into MARC format for export to locations and vice versa. (*Appendix v*)

CHECKLIST 32: MAINTENANCE

No.	FEATURES	Weighting		
		Y/N	S1	S2
1	System provides for easy data base maintenance	Y	4	4
2	System allows maintenance of index records	Y	3	3
3	System provides for data file maintenance: <ul style="list-style-type: none"> - At different levels: <ul style="list-style-type: none"> • track • record • field • data element • character - On-line - Batch mode 	N Y Y Y N Y Y	1 1 1 1 1 2 1	0 1 1 1 0 2 1
4	System vendor provides software maintenance: <ul style="list-style-type: none"> - Via on-line remote terminal - On-site 	Y N	4 1	1 0
5	System vendor provides software enhancements regularly	Y	2	2
6	System vendor provides continuing improvements and enhancements	Y	4	4
7	Software enhancements easily installed	Y	2	2
8	System vendor provides consistent, routine hardware maintenance	Y	3	2
9	System vendor provides emergency maintenance service promptly and efficiently	Y	4	3
10	All maintenance is responsibility of system vendor	Y	5	4
11	Organisation other than system vendor responsible for maintenance of: <ul style="list-style-type: none"> - Application software - Operating system software - Programming languages - Utility software - Computer hardware - Disk drives, media - Other peripheral equipment - Terminals - Communication equipment (exclusive of common carrier facility) - Documentation 	N N N N N N N N N N	-2 -2 -2 -2 -2 -2 -2 -2 -2 -2	0 0 0 0 0 0 0 0 0 0
10	Criterion Feature score		40	31
280	Cumulative score (b/f) from checklist 31		1338	939
290	Cumulative score		1378	970

ANALYSIS OF CHECKLIST 32

Database maintenance is easily accomplished through addition of new records, editing of old ones, creation of new records from old, and deleting of

records from the database. The system allows maintenance of Name, Subject, Title and Classmark indexes. The vendor provides help lines for US and Canada. All hardware and software maintenance would be arranged in the contract at the time of purchase. Matthews, Williams and Wilson (1990) report in their evaluation that the vendor provides good support.

CHECKLIST 33: WORK TRACKING

No.	FEATURES	Weighting		
		Y/N	S1	S2
1	System tracks item through workstations via: - machine-readable item identification numbers - user input	Y Y	5 2	4 2
2	System tracks items: - Queued for cataloguing - In cataloguing - Delayed in cataloguing - In physical preparation - Delayed in physical preparation - To and from shelving	N N N N N N	1 1 1 1 1 1	0 0 0 0 0 0
3	System creates and maintains work tracking record by: - IIN - Date and time of start and end of processing of each item - Workstation identifier - Staff member identifier - Type of item - Notes	Y Y Y Y Y N	1 2 1 1 1 1	1 2 1 0 1 0
4	System automatically computes: - Transit times - Queue wait times	N N	1 1	0 0
5	System produces exception reports for items remaining at a given workstation longer than some threshold value.	N	2	0
6	System produces work tracking summary reports: - Routinely - On demand	Y N	1 2	1 1
6	Criterion Feature score		27	13
290	Cumulative score (b/f) from checklist 32		1378	970
296	Cumulative score		1405	983

ANALYSIS OF CHECKLIST 33.

The function of work tracking is inadequate it should be enhanced. However, virtually all OPAC activity are well tracked.

CHECKLIST 34: BACK-UP & RESTORATION

No.	FEATURES	Weighting		
		Y/N	S1	S2
1	System backs up all files: <ul style="list-style-type: none">- Simultaneous with routine operation- Daily- Every other day- Twice weekly- Weekly- Less frequently	N Y Y Y N N	5 4 3 1 -1 -3	0 4 3 1 0 0
2	System journalises on-line transactions	Y	5	5
3	System captures basic cataloguing input transactions when processor is down	N	5	0
4	Recovery of files and processing is fast and simple	Y	5	4
5	Recovery based on journal file and audit trail	N	4	0
6	History of transactions file maintained	Y	3	3
6	Criterion Feature score		31	20
296	Cumulative score (b/f) from checklist 33		1405	983
302	Cumulative score		1436	1003

ANALYSIS OF CHECKLIST 34.

The system permits the user to Backup and Restore library datafiles using either LS Backup program or DOS. The former maintains a log backup.

CHECKLIST 35: SOFTWARE PORTABILITY

No.	FEATURES	Weighting		
		Y/N	S1	S2
1	Easily accommodates varied library policies and practices	Y	4	3
	Software usable on different computers:			
	- Different classes of computer:			
	• Maxicomputers	N	1	0
	• Minicomputers	N	1	0
	• Microcomputers	Y	1	1
	- Different models of same vendor	Y	2	2
	- Different vendor systems	Y	3	2
2	Software upward compatible on different models of same computer	Y	2	1
3	System physically portable	Y	1	1
3	Criterion Feature score		15	11
302	Cumulative score (b/f) from checklist 34		1436	1003
30	Cumulative score		1451	1014

ANALYSIS OF CHECKLIST 35.

The Columbia Library System is a microcomputer-based software that is easily portable across IBM PC or compatibles.

CHECKLIST 36: TELECOMMUNICATION

No.	FEATURES	Weighting		
		Y/N	S1	S2
1	Provides computer-to-computer communication	Y	4	3
2	Provides for character-oriented communication	Y	2	1
3	Provides for:			
	– Block-mode communication	Y	4	2
	– Multipoint line configuration	Y	3	2
4	Supports:			
	– Automatic dialling	N	2	0
	– Synchronous communication	Y	2	2
	– Asynchronous communication	N	1	0
	– Local area networking	Y	2	2
	– Various data transmission speeds			
	• 4800 bits per second (bps)	N	1	0
	• 9600 bits per second (bps)	Y	1	1
5	Supports two or more standard protocols	Y	2	1
6	Conforms to International Standards Organisation Open Systems Interconnection Reference Model (OSI)	Y	2	2
7	Supports use of microcomputers as terminals	Y	2	2
7	Criterion Feature score		30	16
305	Cumulative score (b/f) from checklist 35		1451	1014
312	Cumulative score		1481	1030

ANALYSIS OF CHECKLIST 36.

The system supports Local Area Network (LAN) on Novell Software.

CHECKLIST 37: SYSTEM CAPACITY

No.	FEATURES	Weighting		
		Y/N	S1	S2
1	System can be conveniently sized for a given installation: <ul style="list-style-type: none"> - Data base capacity - Number of terminals - Memory size - Number of communication ports - Processor capacity (transactions per second) 	Y Y Y Y Y	4 3 3 2 4	4 3 3 2 4
2	System can be shared by two or more functional units: <ul style="list-style-type: none"> - With common policies - With distinct policies 	Y Y	2 3	2 1
3	System can be readily expanded to accommodate: <ul style="list-style-type: none"> - Increased: <ul style="list-style-type: none"> • record size • data base size • transaction load • number of terminals • telecommunications traffic - Additional peripherals e.g. printers 	N N N N N N	2 2 2 2 1 2	0 0 0 0 0 0
4	System expansion can be easily accomplished via fields upgrade	N	4	0
5	System can easily be field-upgraded to accommodate additional libraries	Y	5	4
5	Criterion Feature score		41	23
313	Cumulative score (b/f) from checklist 36		1481	1030
318	Cumulative score		1522	1050

ANALYSIS OF CHECKLIST 37.

The system does not use the expanded memory.(Enhancement no.1)

No.	FUNCTIONS	Weighting		
		S1	S2	Ratio
1.	General Requirements	51	38	0.75
2.	Database Access (CF)	63	43	0.68
3.	Search of Data (CF)	67	51	0.76
4.	Retrieval (CF)	28	23	0.82
5.	Support Facilities of retrieval	20	9	0.45
6.	MARC Support Capabilities	66	41	0.62
7.	Cataloguing Data Entry (CF)	86	59	0.69
8.	Verification & Validation of Record Structure (CF)	30	28	0.93
9.	Data Element Identifier Verification (CF)	17	16	0.94
10.	Internal consistency Verification & Validation	25	23	0.92
11.	Spelling Error Detection & Correction	39	0	0
12.	Identification Number Validation (CF)	30	22	0.73
13.	Vocabulary Control (CF)	96	75	0.78
14.	Format, Punctuation, Spacing & Capitalisation (CF)	10	8	0.8
15.	Redundancy Elimination	31	27	0.87
16.	Enrichment of Subject & Content Data	44	40	0.91
17.	Item Identification (CF)	29	19	0.66
18.	Shelflisting and Ranging	34	10	0.29
19.	Documentation (CF)	62	38	0.61
20.	Physical Preparation	22	15	0.68
21.	Audit Trail (CF)	46	32	0.70
22.	Displays of Message etc. (CF)	99	80	0.81
23.	Printed Output	18	9	0.50
24.	Access Control (CF)	51	47	0.92
25.	Overrides	27	12	0.44
26.	Defaults	25	22	0.88
27.	Messaging	16	13	0.81
28.	Help	34	25	0.74
29.	Reports	53	30	0.57
30.	Report Generator	41	15	0.37
31.	Data Update & Conversion (CF)	78	69	0.88
32.	Maintenance	40	31	0.78
33.	Work Tracking	27	13	0.48
34.	Backup & Restoration (CF)	31	20	0.65
35.	Software Portability	15	11	0.73
36.	Telecommunication	30	16	0.53
37.	System Capacity	41	23	0.56
38.	System Reliability (CF)	8	13	1.63
	Total Function Score	1530	1066	0.70

Table 5.2 Score for all Functions

5.2.1 Analysis of Performance Ratio for all the Functional Requirements

To establish the performance ratio of the Columbia Library System 'S2' for all the functional requirements, it entails summing up all the total scores for

CHECKLIST 38: SYSTEM RELIABILITY

No.	FEATURES	Weighting		
		Y/N	S1	S2
1	System available:			
	– 95% of scheduled time	N	5	0
	– 97% of scheduled time	Y	6	6
	– 99% of scheduled time	N	7	0
2	System vendor provides contractual assurance of up-time	Y	8	7
3	Significant weakness evident in:			
	– Processing (transactions)	N	-2	0
	– Data base	N	-2	0
	– Telecommunications	N	-2	0
	– Terminals	N	-2	0
	– Peripherals	N	-2	0
	– Insulation from power losses	N	-2	0
	– Insulation from central system failure	N	-3	0
	– Back-up/recovery	N	-3	0
3	Criterion Feature score		8	13
318	Cumulative score (b/f) from checklist 37		1522	1053
321	Cumulative score		1530	1066

ANALYSIS OF CHECKLIST 38.

The system is reliable and it is available 97% of the time. It has been working perfectly well for the period of six months during evaluation.

all its features and then those of the ideal system ‘S1’ for the baseline score and compare the two. The ratio is:

Total score for Columbia Library System (S2)
=
1066

Total baseline score (S1)
=
1530

Columbia Library System Performance Ratio
for Functional Requirements
=
 $\frac{1066}{1530} = 0.696$

=
0.70

The findings indicate that the overall performance ratio for the functional requirements is well above the arbitrary level of 0.6.

5.2.2 Analysis of Critical Functions

The critical functions are pulled out for analysis because they are mandatory for the functioning of the cataloguing system. They are:

No.	Functions	Weighting		
		S1	S2	Ratio
1.	Database Access	63	43	0.68
2.	Search	57	51	0.76
3.	Retrieval	28	23	0.82
4.	Cataloguing Data Entry	86	59	0.69
5.	Verification & Validation Of Record Structure	30	28	0.93
6.	Data Element Identifier	17	16	0.94
7.	Identification Number Validation	30	22	0.73
8.	Vocabulary Control	96	75	0.78
9.	Item Identification	29	19	0.66
10.	Audit Trail	46	32	0.69
11.	Displays Of Messages	99	80	0.81
12.	Access Control	51	47	0.92
13.	Database Update & Conversion	78	69	0.88
14.	Backup & Restore	31	20	0.65
15.	Documentation	62	38	0.61
16.	Format, Punctuation, Spacing And Capitalisation	10	8	0.80
17.	System Reliability	8	13	1.63
Total Score for Critical Functions		831	643	0.77

Table 5.3 Score for Critical Functions

To establish the performance ratio for the critical functions the procedure is the same as in the previous analysis.

Total System score S2)	=	643
Total Baseline score (S1)	=	831
Columbia Library System Performance Ratio for Critical Functions	=	$\frac{643}{831} = 0.77$

The performance ratio of the critical functions is well above the arbitrary cut-off ratio of 0.6.

5.3 Evaluation of the Usability Requirements

The study adopts the Ravden & Johnson methodology of ten checklists for the usability requirements. For consistency the checklists are modified into statements like those of Rush. Each checklist comprises of several features that make up the usability requirements characteristic of a good cataloguing system. Each feature is assigned a numerical score of 10. The ideal system is designated 'S1' while the candidate system is 'S2'. A brief analysis is provided for each checklist for clarity and to bring out any significant points.

CHECKLIST 1: VISUAL CLARITY

No.	FEATURES	Weighting		
		Y/N	S1	S2
1	Each screen is clearly identified with an informative title or description	Y	8	7
2	Important information is highlighted on the screen (e.g. cursor position, instructions, errors)	Y	5	4
3	When the user enters information on the screen, it is clear to the user:			
	– on where the information should be entered	Y	5	5
	– in what format it should be entered	Y	5	5
4	When the user types information on the screen, the system clears the previous information as he types	Y	2	1
5	Information is logically organized on the screen (e.g. menus organized by probable sequence of selection, or alphabetically)	Y	4	3
6	Different types of information is clearly separated from each other on the screen (e.g. instructions, control options, data displays)	Y	5	4
7	Large amount of information is clearly separated into sections on the screen	Y	3	3
8	Columns of information clearly aligned on the screen (e.g. columns of alphanumeric left-justified, columns of integers right-justified)	Y	2	2
9	Bright or light colours displayed on a dark background and vice versa	Y	2	2
10	Use of colour helps to make the displays clear	Y	4	3
11	Colour setting can be tailored to users	Y	5	4
12	Information on the screen easy to see and read	Y	6	5
13	Screens appear uncluttered	Y	4	3
14	It is easy to search for required information on a screen	Y	4	3
14	Criterion Feature score		64	54

ANALYSIS OF CHECKLIST 1.

The system support distinctive screens for each particular function. By default the system deletes the previous information as the user types over. Screens are not cluttered because the information is controlled by fields and the user is guided by the prompt. When it is retrieved it conforms to the International Standard Bibliographic Description (ISBD). Default screen colours can be edited using the 'UTILITY' menu to match the local tastes. It is against this background that the visual clarity is assessed to be very good.

CHECKLIST 2: CONSISTENCY

No.	FEATURES	Weighting		
		Y/N	S1	S2
1	Colours are used consistently throughout the system	Y	5	3
2	Abbreviations, acronyms, codes and other alphanumeric information are used consistently throughout the system	Y	2	2
3	Icons, symbols, graphical representations and other pictorial information are used consistently throughout the system	Y	2	2
4	The same type of information is displayed: -- In the same location on the screen -- In the same layout	Y	3	2
		Y	3	2
5	The cursor appears in the same initial position on displays of a similar type	Y	3	3
6	The same item of information is displayed in the same format, wherever it appears	Y	4	3
7	The format for input data is consistent for each type of information	Y	8	7
8	The method of entering information is consistent	Y	5	4
9	The action required to move the cursor around the screen is consistent	Y	3	2
10	The method of selecting options is consistent	Y	3	2
11	The same keys are used for the same function	Y	3	2
12	Standard procedures for carrying out similar, related operations are applied.	Y	4	3
13	The system responds consistently to a particular user action	Y	5	4
	Criterion Feature score		53	40
	Cumulative score (b/f) from checklist 1		64	54
	Cumulative score		117	94

ANALYSIS OF CHECKLIST 2.

The system constantly displays the same information pertaining to a particular screen. It is also consistent to user actions. However, the date field is inconsistent because the system accepts variant formats: MMYDD, MMDDYY and YYMMDD.

CHECKLIST 3: COMPATIBILITY

No.	FEATURES	Weighting		
		Y/N	S1	S2
1	Colours are assigned according to conventional rules (e.g. red = alarm, stop)	Y	4	3
2	Abbreviations, acronyms, codes and other alphanumeric information follow conventions and are easy to understand	Y	2	2
3	Jargon and terminologies used in the system are familiar to the user	Y	3	3
4	Conventional formats are followed for the particular types of information (e.g. layout of dates and telephone numbers)	Y	3	2
5	Information presented and analysed in the terms familiar to the user	Y	3	3
6	The format of displayed information is compatible with the form in which it is entered into the system	Y	3	3
7	The format and sequence in which information is printed is compatible with the way it is displayed on the screen	Y	4	4
8	Control actions are compatible with those used in other systems with which the user may need to interact	Y	3	2
9	Information presented fits the user's view of the task	Y	3	2
10	Organisation and structure of the system fits the user's perception of the task	Y	4	3
11	The sequence of activities required to complete a task follows what the user would expect	Y	3	2
12	The system works in the way the user thinks it should work	Y	6	5
	Criterion Feature score		41	34
	Cumulative score (b/f) from checklist 2		117	94
	Cumulative score		158	128

ANALYSIS OF CHECKLIST 3.

The system conforms to several international conventional rules, such as the alarm, jargon and terminologies, ISBD, and the Anglo-American Cataloguing Rules (AACR2).

CHECKLIST 4: INFORMATIVE FEEDBACK

No.	FEATURES	Weighting		
		Y/N	S1	S2
1	Instructions and messages displayed by the system are concise and positive	Y	5	4
2	Messages displayed are relevant	Y	4	3
3	Instructions and prompts clearly indicate what to do	Y	5	3
4	Actions are clear to the user at every stage	Y	5	3
5	Instructional messages are clear	Y	5	3
6	Information entered on the screen is clearly displayed	Y	3	3
7	System minimises on repetitive work	Y	3	2
8	Changes that occur on the screen as a result of a user input or action are made clear	Y	2	1
9	There is always an appropriate system response to a user input or action	Y	5	4
10	Status messages (e.g. indicating what the system is doing or has just done) are: – informative – accurate	Y Y	5 5	2 3
11	The system clearly informs the user when it completes a requested action (successfully or unsuccessfully)	Y	3	3
12	The system promptly informs the user of any delay, making it clear that the user's input or request is being processed	Y	3	2
13	Error messages explain clearly: where the errors are what the errors are why they have occurred	Y Y N	2 3 3	2 3 2
14	System informs the user on what to do to correct an error	Y	3	1
	Criterion Feature score		64	44
	Cumulative score (b/f) from checklist 3		158	128
	Cumulative score		222	172

ANALYSIS OF CHECKLIST 4.

The system consistently alerts the user whenever it completes the action successfully by displaying the next field or screen and prompting for further action. However, if there is an error it sounds an clear 'beep' augmented by an error message on the screen. Occasionally it suggests alternatives. In most cases the user cannot proceed unless the mistake is corrected.

CHECKLIST 5: EXPLICITNESS

No.	FEATURES	Weighting		
		Y/N	S1	S2
1	System shows clearly the stage it has reached in a task	Y	4	4
2	System shows clearly what the user needs to do in order to accomplish a task	Y	5	3
3	Each option in a given list (e.g. in a menu) is clear and precise	Y	4	3
4	System informs the user what part he is in	Y	3	3
5	It is clear what the different parts of the system do	Y	3	2
6	It is clear how, where and why changes in one part of the system affect other parts of the system	N	3	0
7	It is clear why the system is organised and structured as it is	N	3	0
8	It is clear why a series of screens are sequenced as they are	Y	3	2
9	System is well-organised from the user's point of view	Y	4	3
10	Interface metaphor (e.g. the desk-top metaphor in office applications), made explicit	Y	2	1
11	Application of a metaphor is made explicit	Y	2	1
12	In general, the user is clear of what the system is doing	Y	5	4
	Criterion Feature score		41	26
	Cumulative score (b/f) from checklist 4		222	172
	Cumulative score		263	198

ANALYSIS OF CHECKLIST 5.

The system is well organised but not very explicit on how to go about some functions. The 'HELP' facility is not comprehensive inspite of the fact that it provides EXPERT HELP, F1 and NOVICE HELP, Ctrl F1. Consequently the user has to refer to the manual more often than is required. On several screens the HELP messages are redundant especially the arrow Keys which are constantly displayed and the user advised to use them and yet quite often they are non-functional. A user guide in form of a leaflet would be of great help.

CHECKLIST 6: APPROPRIATE FUNCTIONALITY

No.	FEATURES	Weighting		
		Y/N	S1	S2
1	The input device available to the user (e.g. pointing device, keyboard, joystick) is appropriate for the tasks to be carried out	Y	5	5
2	The way in which information is presented is appropriate for the tasks	Y	4	4
3	Each screen contains all the information which the user feels is relevant to the task	Y	4	2
4	User is provided with all the options which are necessary at any particular stage in a task	Y	4	3
5	User accesses all the information needed for the current task	Y	4	4
6	System allows user to do what is necessary in order to carry out a task	Y	4	4
7	System feedback is appropriate for the task	Y	5	4
8	Help and tutorial facilities make use of realistic data and problems	N	3	0
9	Task-specific jargon and terminology are defined at an early stage in the task	N	3	0
10	Interface metaphors used are relevant to the tasks carried out	Y	2	1
11	Long task sequences are broken into appropriate constituent parts	Y	2	2
	Criterion Feature score		40	20
	Cumulative score (b/f) from checklist 5		263	198
	Cumulative score		303	227

ANALYSIS OF CHECKLIST 6.

The system supports appropriate functionality to enable the user to accomplish the cataloguing and the related functions. It ranks high.

CHECKLIST 7: FLEXIBILITY AND CONTROL

No.	FEATURES	Weighting		
		Y/N	S1	S2
1	There is an easy way for the user to 'undo' an action and step back to a previous stage or screen	Y	5	3
2	User can 'undo' an action and be able to redo it	Y	5	5
3	Shortcuts are available when required (e.g. to bypass a sequence of activities or screens)	Y	3	2
4	User has control over the order in which he requests for information, or carries out a series of activities	Y	4	3
5	User can look through a series of screens in either direction	Y	3	1
6	In menu-based systems, it is easy to return to the main menu from any part of the system	Y	4	4
7	User can move to different parts of the system as required	Y	5	4
8	User is able to finish entering information before the system responds	Y	4	5
9	System allows prefill repeated information on the screen to save the user having to enter the same information several times	Y	3	2
10	System permits user to choose whether to enter information manually or to let the computer generate information automatically (e.g. where there are defaults)	N	3	0
11	User can override computer-generated information (e.g. defaults)	Y	3	2
12	User can choose the rate at which information is presented	Y	2	1
13	User can choose how to name and organise information which may need to be recalled at a later stage (e.g. files, directories)	Y	3	1
14	User can tailor certain aspects of the interface for preference or needs (e.g. colours, parameters)	Y	5	5
	Criterion Feature score		52	36
	Cumulative score (b/f) from checklist 6		303	227
	Cumulative score		355	263

ANALYSIS OF CHECKLIST 7.

The cataloguing system interface is relatively flexible. It allows several default values to be tailored to the user needs, through the 'UTILITY' menu. The screens and screen messages can be edited, in particular MENU OPTION, FIELD LABELS, ERROR MESSAGES HELP and SCREEN COLOURS. In addition, report formats and the Machine Readable Catalog (MARC) field tags can be modified. However, the system retains control over the changes by retaining the default parameters. The assessment is that the system supports appropriate flexibility and control to enable it to retain its integrity.

CHECKLIST 8: ERROR PREVENTION & CORRECTION

No.	FEATURES	Weighting		
		Y/N	S1	S2
1	System validates inputs before processing	Y	8	7
2	System clearly informs the user when it detects an error	Y	8	5
3	System informs the user when the amount of information entered exceeds the available space	N	4	0
4	User is able to check what they have entered before it is processed	Y	5	3
5	There is some form of cancel (or 'undo') for the user to reverse an error	N	3	0
6	Error can be corrected easily	Y	5	4
7	System ensures that the user corrects all detected errors before the information is processed	Y	5	5
8	System is protected against common trivial errors	Y	3	2
9	System ensures that the user double-checks any requested actions which may be catastrophic if requested unintentionally	Y	6	5
10	System prevents users from taking actions which they are not authorised to take (e.g. by requiring passwords)	Y	5	4
	Criterion Feature score		52	35
	Cumulative score (b/f) from checklist 7		355	263
	Cumulative score		407	298

ANALYSIS OF CHECKLIST 8.

The system supports error prevention through controlled access to any part of the system and provision of error messages. Validation, verification and authority control minimise errors, but the intellectual effort of the user is essential. However, the system lacks a mechanism for typographical errors.

CHECKLIST 9: USER GUIDANCE & SUPPORT

No.	FEATURES	Weighting		
		Y/N	S1	S2
1	The help facility enables the user to: <ul style="list-style-type: none"> – request it easily from any point – get in and out of the help facility – access the help without interfering with current activities – get clear pertinent help – browse through information about other parts of the system 	Y Y Y Y N	3 2 2 3 3	2 2 2 1 0
2	The hard-copy guide to the system (e.g. user guide or manual) is: <ul style="list-style-type: none"> – Comprehensive in description and in depth covering all aspects of the system – Easy to use to find the required section in the hard-copy documentation 	Y Y	5 3	4 2
3	The organisation of all forms of user guidance and support is related to the task which the user can carry out	Y	4	4
4	User guidance and support facilities adequately explain both user and system errors, and how these should be corrected	Y	5	3
5	All forms of user guidance and support are maintained up-to-date	Y	5	2
	Criterion Feature score		35	22
	Cumulative score (b/f) from checklist 8		407	298
	Cumulative score		442	320

ANALYSIS OF CHECKLIST 9.

The system provides user guide and support through the Help facility and manual. The latter is updated regularly by the vendor through enhancement booklets. It may be more appropriate to produce these in loose pages which can be appropriately fitted into the spiral ring manual. The pages should be clearly labelled with the enhancement numbers, version and date. Using the manual and booklets is cumbersome. To control the volume care should be taken that the upgrade replaces a complete page in the manual. The index to the manual is not exhaustive, for instance, several cataloguing terms are missing: redundant data, audit trail etc. However, the glossary is comprehensive. The manual does not give appropriate prominence to: 'Add See' and 'Add See Also' references. This function should come first followed by 'Change See' and 'Change See Also' references. TUTORIAL programmes with realistic examples would be beneficial.

CHECKLIST 10: SYSTEM USABILITY

No.	FEATURES	Weighting		
		Y/N	S1	S2
1	It is easy to learn how to use the system	Y	5	4
2	Guidance on how to use the system is provided	Y	5	3
3	System documentation is good	Y	5	4
4	Understanding how to carry out the tasks is easy	Y	6	4
5	The system guides the user all along	Y	5	4
6	Understanding how the information on the screen relates to what the user is doing is clear	Y	4	3
7	Finding the information needed is simple and clear	Y	4	3
8	Information is easy to read	Y	5	5
9	Colours are appropriately used	Y	3	3
10	Colours which are different to look at for any length of time are appropriately used	Y	3	2
11	System structure is flexible	Y	4	3
12	Help facility is set at an expert and novice level	Y	3	2
13	System keeps track of activities	Y	3	3
14	Instructional information is precise	Y	4	3
15	System response times are appropriate for the user to understand what is going on	Y	4	3
16	Information stays on the screen for long enough for the user to read it	Y	4	3
17	System response time is fast	Y	3	3
18	System alerts the user of unexpected actions	Y	3	2
19	Input device is easy to use	Y	2	2
20	Easy to learn how to input information	Y	5	4
21	System minimises errors and correction is easier	Y	5	3
22	Correcting errors is easy and fast	Y	3	2
23	Same type of activity is consistently done in the same way	Y	3	3
	Criterion Feature score		91	71
	Cumulative score (b/f) from checklist 9		442	320
128	Cumulative score		533	391

ANALYSIS OF CHECKLIST 10.

The interface has no major setback which makes it a good cataloguing system.

5.3.1 Usability Requirements Score

The total criterion scores for each checklist are tabulated and consequently the system performance ratio is calculated.

No.	FEATURES	S1	S2	Ratio
1.	Visual Clarity	64	54	0.84
2.	Consistency	53	40	0.75
3.	Compatibility	41	34	0.83
4.	Informative Feedback	64	44	0.69
5.	Explicitness	41	26	0.63
6.	Appropriate Functionality	40	29	0.73
7.	Flexibility and Control	52	36	0.69
8.	Error Prevention and Correction	52	35	0.67
9	User Guidance and Support	35	22	0.63
10.		91	71	0.79
	Total Criterion Score	533	391	0.73

Table 5.4 Scores for all Usability Requirements

5.3.2 Analysis of System Performance Ratio for Usability

The total score for S1 provides the baseline score against which to compare the total score for the candidate system S2.

Total Baseline Criterion score = 533

Columbia Library System score = 391

CLS performance Ratio for Usability Requirements = $\frac{391}{533} = 0.73$.

The results indicate that the performance ratio for Usability requirements is well above the arbitrary cut-off ratio of 0.60 (Rush 1985, p.124).

5.4 Evaluation of MARC Support Requirements

To establish the extent of MARC support for the data elements required for cataloguing, the study lists the MARC tags against the cataloguing field tags.

Data Element	Cataloguing Data field Tags	MARC Field Tags of CLS
Names:		
Main entry - personal name	10	100
Main entry - Corporate or geographical name	11	110
Main entry - Meeting and conference	12	111
Added entry - personal name	70	700
Added entry - Corporate name	71	710
Added entry - Meeting and conference	72	711
Series - Personal name/Title	80	800
Series - Corporate	81	810
Series - Meeting or conference	82	
Subject:		
Personal name	60	600
Corporate name	61	610
Meetings and conferences	62	611
Uniform title	63	630
NASA Subject term	64	649
Topical	65	650
Geographical name	66	651
Reversed geographical	67	652
General	68	655
Title:		
Main entry	13	130
Uniform title	24	240
Title proper	25	241
Romanised title	26	241
Translation of title by cataloguing agency	27	243
Collective title	28	245
Series	44	440
Added - untraced or traced differently	49	490
Added entry - uniform title	73	730
Added entry - traced differently	74	740
Series - uniform title	83	830
Series - not in Series form	84	840
Bibliographic Root (Biblio Root):		
Fixed field	008	008
Intellectual level, 07	07	07
Literary text, 15	15	15
Language used in material, 17	17	17
type of machine readable file, 57	57	57
Type of material, 66	66	66
Type of picture, 84	84	84

RSN		000
LCCN		10\$a
ISBN		20\$a
ISSN		22\$a
Place		260\$a
Publisher		260\$a
Date		260\$a
Edition		250\$a
collation		300\$a,b,c.
Call Number		090
Holdings		090
Sub-location		090
Location note		090
Notes		505,520,535,538
Authority control.		
<i>See Name:</i>		
Personal Name	40	400
Corporate Name	41	410
Conference/meetings	42	411
<i>See Also Name:</i>		
Personal Name	50	500
Corporate Name	51	510
Conference/meetings	52	511
<i>See Subject:</i>		
Topical Subject	45	450
Geographical Name	46	451
Reversed Geographical	47	452
<i>See Also Subject:</i>		
Topical Subject	55	550
Geographical Name	56	551
Reversed Geographical	57	552
<i>See Title:</i>		
Uniform Title Heading	53	530
<i>See Also Title:</i>		
Uniform Title Heading	43	430
Uniform Title	44	440
Collective title	45	443

Table 5.5 MARC Field Tags

To ascertain if the catalogued records are converted to MARC format, select RECORDS in the Catalog Option. Select NEARFIL format and print to be able to carry out the analysis (Appendix v). The records also convert to MicroLIF format for book jobbers.

5.5 Summary of System Performance Ratio

The performance ratio of the Catalog Module of the Colombia Library system is summarised in the Table 5.6. The ratios are discussed in details in Chapter 6.

ATTRIBUTES REQUIREMENTS	SYSTEM PERFORMANCE RATIO
FUNCTIONALITY	0.70
CRITICAL FUNCTIONS	0.77
USABILITY	0.73
THE OVERALL ASSESSMENT	0.73

Table 5.6 Summary of System Performance Ratio

MARC support, requirements is rated very high because the findings indicated that it supports virtually all the data elements required for cataloguing since all the catalogue records are converted to MARC format (Appendix v).

CHAPTER 6

DISCUSSION, CONCLUSION AND RECOMMENDATIONS

6.1 Discussion

This chapter discusses the merits and demerits of the Catalog Module of the Columbia Library System version (CLS) 2.08. The evaluation results in Chapter 5 show that the system performance ratio of 0.70 for functionality and 0.73 for usability are well above the arbitrary cut-off level of 0.6 required in a good cataloguing system. On functionality, the system excelled in verification and validation of record structure, data element identifier verification, internal consistency, access control and enrichment of subject content. On usability the interface is rated as 'user friendly'. It scored high on visual clarity. The flexibility augments the usability attributes, because it allows the user to edit 21 tables to tailor them to the local preferences.

The findings indicate that the MARC interface supports virtually all the critical and essential cataloguing functions. This was established by printing out the system catalogued records which had been converted to MARC format. The MARC interface supports several commonly used vendor MARC formats such as BIBLIO, COMM, GEAC, LIF, MITNET, NEARFIL and bibliographic utilities such as OCLC, UTLAS, WLN, RLIN and LC MARC. It permits the user to edit the MARC tags to tailor them to local needs. In addition it provides several blank fields to allow the user to define the non-standard MARC field tags to accommodate local information. It converts system catalogued records into MARC format for export to locations and vice versa.

However a few features did not score high enough and they deserve

attention. The most prominent weak point is that it does not provide for typographical error detection and correction. This is the only feature where it attained a negative score. The Researcher attaches much importance to this feature bearing in mind that any slightest spelling error can result in redundant data. Documentation did not score high mainly because of the poor index. The production of the enhancement books defeats the purpose of the 3-ring spiral binder manual. On the side of usability there are a few redundant screen help messages and arrow keys.

6.2 Re-examination of Research Objectives Formulated in Chapter 1

1. *Was the study able to establish whether the Catalog Module of the Columbia Library system has the functional requirements of a typical second generation microcomputer-based cataloguing system? And if so is it suitable for automation needs of the Uganda National Agricultural Library?*

The study findings show that the Catalog Module possesses most of the system functional features and attributes required in a cataloguing system. With reference to the objectives of the Library the Module is found to be suitable for its automation needs.

2. *To investigate whether CLS has the usability requirements of a user-friendly catalogue interface.*

The performance ratio indicate that the system scores high in usability which makes it suitable for the Library

3. *To establish the MARC Support for the cataloguing data elements.*

The analysis of the MARC field tags of the interface indicate that it supports all the critical and essential cataloguing data elements.

4. *Establish the implications of the study on evaluating other automated library systems.*

The candidate system 'S2' is independently compared against the checklist for functional and usability features which gives an absolute ranking relative to the baseline score of 'S1'. In view of this the methodology can be used for any other system for evaluation.

The study has demonstrated the feasibility of conducting an objective evaluation of online catalogue systems. It has also provided an empirical basis for user-feedback for pursuing continued development and enhancement by the vendor

6.3 CONCLUSION

The Catalog Module of the Columbia Library System has a high performance ratio score for functionality of (0.7), critical functions (0.77) and usability (0.73) The system is portable, compatible and regularly enhanced. The MARC interface virtually supports all the cataloguing data elements required in a good cataloguing module It is against this background that the Researcher confidently concludes that the Columbia Library System is suitable for the Uganda National Agricultural Library for its automation needs.

6.4 RECOMMENDATION

A Library body in collaboration with experts in system evaluation such as Rush Associates (1985), Ravden & Johnson (1989), Matthews, Williams & Wilson (1990) and Boss (1993) should develop a user-friendly standard checklist software for functionality, usability and MARC support to audit trail all the activities for the 'evaluation-feedback'. This would give the success rate of the implementation of any function of the candidate system.

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Shelf List for all Records within a given RSN Range.(Appendix 1)

- 636.52/. Wong, Gauna
58(9)07 Broiler production for the South Pacific : a teacher's guide /
6)WON Gauna Wong. - Apia, Western Samoa : Institute for Research,
Extension and Training in Agriculture (IRETA), 1992.
vi, 217 p.

Printed with CTA's financial assistance.
ISBN 9821750168. RSN 00000053.

1. BROILER PRODUCTION I. Title

- 631.52 C Conservation biology : a training manual for biological diversity
ON and genetic resources / Promila Kapoor-Vijay, Commonwealth
Science Council, James White. - London : Commonwealth Science
Council, 1992.
vi, 248 p.

Includes index.
ISBN 0850923921. RSN 00000054.
1. BIOLOGY 2. CONSERVATION 3. GENETIC RESOURCES 1.
Kapoor-Vijay, Promila II. Commonwealth Science Council
III. White, James

- 632.7(21 Hill, Dennis S.
3) HIL Agricultural insect pest of the tropics and their control /
Dennis S. Hill. - 2nd. ed. - New York : Cambridge University Press
, 1983.
xii, 332 p.

Includes Bibliography and index.
ISBN 0521288673. RSN 00000055.

1. TROPICAL CROP PESTS 2. PEST-CONTROL I. Title

- 632.7:63 Common insect pests of stored food products: a guide to their
1.563(02 identification / Lawrence Mound. - London : British Museum
3) COM (Natural History), 1989.
ix, 68 p.

RSN 00000056.

1. STORED FOOD PESTS 2. INSECTS-IDENTIFICATION I. Mound,
Lawrence

Spine Labels for all Records within a given RSN Range.(Appendix i

636. Wong, Gauna
52/. Broiler production for the South Pacific :
58(9 a teacher's guide.
) (07 636.52/.58(9) (076) WON
6) WO
N RSN=00000053

631. Kapoor-Vijay, Proaila
52 C Conservation biology : a training manual
ON for biological diversity and genetic resou...
631.52 CON
RSN=00000054

632. Hill, Dennis S.
7(21 Agricultural insect pest of the tropics
3) H and their control
IL 632.7(213) HIL
RSN=00000055

632. Mound, Lawrence
7:63 Common insect pests of stored food produc-
1.56 ts: a guide to their identification.
3(02 632.7:631.563(023) COM
3) C
OM RSN=00000056

582. Gunn, Charles R.
738: Fruits and seeds of genera in the subfamily
581. caesalpinioideae(fabaceae)
47/4 582.738:581.47/48 GUN
8 GU
N RSN=00000057

632. Commonwealth Institute of Biological Cont...
9(71 Biological control programmes against inse-
) COM cts and weeds, 1959-1968
632.9(71) COM
RSN=00000023

631. Hayes, Herbert Kendall
522 Methods of plant breeding
HAY
631.522 HAY
RSN=00000027

Report for Title Count for all Records.

(Appendix iii)

Title count, all records
94-02-08 21:50 PAGE 1

RSN	Call number	Short title
00000052		
00000017	TR113.S35 .F341	A vision of the past : history of early phot
00000028	633.18:061.6(100)(09) CHA	Adventure in applied science: a history of t
00000055	632.7(213) HIL	Agricultural insect pest of the tropics and
00000042	630.96761 AGR	Agriculture in Uganda / edited by J. D. Jame
00000048		Aspects of educational technology : the proc
00000023	632.9(71) COM	Biological control programmes against insect
00000035	631.5 SPE	Biological efficiency in agriculture
00000053	636.52/.58(9)(076) WDN	Broiler production for the South Pacific : a
00000039	630.24 HAY	Chemistry for agriculture and ecology
00000043	630.2516 PAR	Climate change and world agriculture
00000011	LB1067 .C56 1976	Cognitive learning in children : theories an
00000031	632.7:631.563 HIN	Common insect pests of stored food products:
00000056	632.7:631.563(023) COM	Common insect pests of stored food products:
00000006	LB1028.5 .I116 1989	Computer assisted learning : 2nd internation
00000005	AZ182 .C66 1987	Computer assisted learning in the humanities
00000054	631.52 CON	Conservation biology : a training manual for
00000030	581.19(675) CAS	Contribution a l'etude chimique de quelques
00000021	633.51(62) BAL	Cotton plant in Egypt: studies in physiology
00000022	633.51(62) BAL	Cotton plant in Egypt: studies in physiology
00000049		distribution of national income : proceeding
00000012	ED 1.310/2:262438	Elementary language arts : strategies for te
00000044	630 ELE	Elements of agriculture / edited by D. H. Ro
00000041	630.913 RUT	Farming systems in the tropics / Hans Ruthen
00000026	595.78 SCH	Feeding mechanism of adult Lepidoptera
00000057	582.738:581.47/48 GUN	Fruits and seeds of genera in the subfamily

Report by Authority Names for all Records.

(Appendix iv)

Report by Used Heading

Adamson, R. S. (1)
Adriaens, L. (1)
Atomic Energy Agency (1)
Balls, Lawrence W. (2)
Bennett, Rodney (1)
British Broadcasting Corporation (1)
Brown, C. Marlin (1)
Campbell, Sally (1)
Castagne, E. (1)
Chandler, Robert F. (1)
Chao, Yuan Tsien D. (1)
Clyde, David (1)
Collinson, M. P. (1)
Commonwealth Institute of Biological Control (1)
Commonwealth Science Council (1)
Corbet, Steven A. (1)
Day, P. (1)
Ducros, Bernard (1)
Economic and Social Research Council (Great Britain) (1)
Edigar, Divid C. (1)
F.A.O Plant Production and Protection Division (1)
Falconer, John, 1951- (1)
Fream, W. (1)
Gearheart, Bill R., 1928- (1)
Gillman, Peter (1)
Goodsman, Thomas Harper (1)
Grant, Patrick (1)
Great Britain. Home Office (1)
Gunn, Charles R. (1)
Haq, N. (1)

00100000053

10010\$aWong, Gauna

24510\$aBroiler production for the South Pacific : a teacher's guide.

60014\$aBroiler Production

020 \$a9821750168

033 \$a940208\$b940208

090 \$a636.52/.58(9)(076)WON\$r00000053

2600 \$aApia, Western Samoa\$bInstitute for Research, Extension and Training
in Agriculture (IRETA)\$c1992

300 \$avi, 217 p.

500 \$aPrinted with CTA's financial assistance.

967 \$a00000053\$zTRUE

969 \$an

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00100000054

70010\$aKapoor-Vijay, Promila

71020\$aCommonwealth Science Council

70010\$aWhite, James

13000\$aConservation biology : a training manual for biological diversity and
genetic resources.

65004\$aBiology

65004\$aConservation

65004\$aGenetic Resources

020 \$a0850923921

033 \$a940208\$b940208

090 \$a631.52 CON\$r00000054

2600 \$aLondon\$bCommonwealth Science Council\$c1992

300 \$avi, 248 p.

500 \$aIncludes index.

967 \$a00000054\$zTRUE

969 \$an

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10010\$aHill, Dennis S.

24510\$aAgricultural insect pest of the tropics and their control

65004\$aTROPICAL CROP PESTS

65004\$aPEST-CONTROL

020 \$a0521288673

033 \$a940208\$b940208

090 \$a632.7(213) HIL\$r00000055

250 \$a2nd. ed.

2600 \$aNew York\$bCambridge University Press\$c1983

300 \$axii, 332 p.

500 \$aIncludes Bibliography and index.

967 \$a00000055\$zTRUE

969 \$an

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70010\$aMound, Lawrence

13000\$aCommon insect pests of stored food products: a guide to their
identification.

65004\$astored food pests

65004\$aInsects-identification

033 \$a940208\$b940208

090 \$a632.7:631.563(023) COM\$r00000056

2600 \$aLondon\$bBritish Museum (Natural History)\$c1989

300 \$aix, 68 p.

967 \$a00000056\$zTRUE

969 \$an

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