
The development of computerised library services in Pakistan

Computerised
library services
in Pakistan

A review of the literature

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Abstract *Computer technology in libraries has revolutionised the concept of rapid and accurate information services. In Pakistan, though, computer technology is new and is being successfully introduced in all types of libraries and information centres. This article reviews the literature on the use of computers in Pakistan's libraries. The literature includes monographs, journal articles, reports, etc. published inside and outside Pakistan, discussing information technology, specific library applications, the activities of individual libraries and automation education. The need for library automation and the problems faced by Pakistani professionals in this respect are also discussed.*

Introduction

Although the use of computers in libraries and information centres is a recent innovation in the developed world, during the last ten years a significant number of Pakistani libraries have also been enjoying the benefits of this technology. With the inception of computer technology in libraries new terms like "information technology" and "library automation" have become common. Computers, telecommunications and microelectronics are used in libraries for obtaining, storing and transferring information. The ability of a computer to carry out these library functions quickly, accurately, and systematically, makes it a most useful tool. The timely availability of information can play a fundamental role in the development of a country like Pakistan.

International agencies played a very important role in introducing computerised library services to Pakistan. Among these organisations the most noteworthy are the Asia Foundation, USAID, the International Development Research Centre of Canada, and the Netherlands government. These agencies provided Pakistani libraries with funds and advisory services. During the 1990s the Netherlands Library Development Project (NLDP) was instrumental in introducing new information technology to Pakistan. Its major projects included the provision of hardware to libraries and library schools, establishment of computer centres, training of professionals inside and outside Pakistan, library software development, retrospective conversion, developing CD-ROM databases, and introducing information technology into the library science curriculum.

From the beginning of computer use in Pakistani libraries, authors in the field of library and information science have written about it. A reasonable

amount of literature on information technology has so far been produced in Pakistan. This article is an attempt to collect and review the literature on this significant topic. The aim of this review is to describe the situation of computer use in Pakistani libraries and also to provide researchers in this field with a bibliography on the subject.

Definition and scope

This article focuses on activities which are being carried out in Pakistani libraries in the field of automation. Almost all the literature published on the subject in Pakistan emphasises the importance and need for computers in libraries, and many papers include brief report on current hardware, telecommunications and library software. Computerised services in libraries such as housekeeping routines, information storage and retrieval, and networking are also discussed. Some authors outline methods of using computers in libraries. The literature includes many case studies of individual libraries throughout the country.

In preparing this article, 124 items (books, journal articles, reports, conference/workshop proceedings, and some unpublished documents) have been reviewed. Every attempt was made to survey the literature comprehensively, both through conventional, indexed sources and the "invisible college" approach. Almost all available items have been included in the review and bibliography. Some items published in Pakistan, but dealing with purely theoretical aspects of library automation or written to describe the activities of advanced countries, have been omitted.

Sources

A majority of the articles covered in this paper were published in library periodicals. The *Pakistan Library Bulletin* is the only library journal which has been successfully published for more than 25 years. It continues to be a key source for materials on any aspect of Pakistani librarianship. It is the source of the highest number of articles in this review (22). Another source of information on library automation is *PULSAA News*, which began publication in 1989. Its two special issues on Pakistani librarianship were later published as books.

Periodical literature published by the Pakistan Library Association is also an important source of articles and reports on library automation. This includes the *Pakistan Library Association Journal* and the newsletters of PLA Headquarters, Punjab and Federal Branches. The University of Peshawar held a conference on library automation in 1993, and the published proceedings were a significant contribution to the literature. Under the auspices of the NLDP, the Library Automation Group was formed in the federal capital city of Islamabad. This group started to publish the *LAG News* in 1993, but after two issues it ceased. The Department of Library and Information Science at Punjab University, Lahore, began publication of an annual magazine named *Pakistani Librarian* in 1995.

Some monographs on the subject of library automation have appeared, mainly on the theoretical aspects of the topic. After searching LISA, some articles published in foreign journals were also included in the review. Other reviewed literature includes articles published in national newspapers, reports of organisations, and some unpublished articles. Of the total of 124 items, 15 are in Urdu.

Need for computerised services

As computers are relatively new in Pakistani librarianship, most writers emphasise their necessity and importance. Asghar (1994) recommends computers for libraries because of their speed and accuracy, factors also mentioned by Chughtaie (1994). Moinuddin (1992) suggests that the proliferation of information can be controlled by computers, and discusses information dissemination which can only be made possible by the use of information technology (Moinuddin, 1994). According to Arshad (1992), there are two main reasons why we develop computer-based library systems: to provide a better service at a lower or insignificant cost, and to provide added benefits economically. Sadiq (1993) expresses the opinion that automation is necessary for public libraries to be part of the nation's modernisation. He also says that "automation enables libraries to place their entire collection at the immediate disposal of the users. Once the electronic systems are adopted, the range of activities of public libraries will also grow. The image of libraries will improve and so will the image of librarians".

Ayub and Ghazanfar (1994) and Riaz (1991) state four reasons for library automation:

- (1) the flood of information;
- (2) services to readers;
- (3) efficiency and accuracy; and
- (4) resource sharing.

According to Shah (1983) computers can save money and time, as data about a holding or transaction are entered into the computer only once. Computerised data are flexible and can be used for various purposes. Taj (1995) mentions the storage problem faced by almost all libraries in the world, and suggests that with the help of computers we can reduce the amount of space taken up by books and reference sources. Liaqat (1993) counts 25 advantages of library automation, including simplicity, portability, durability and security of data; multiple copies; and standardisation and centralisation of services. Khalid (1996) gives ten reasons for library automation, and also provides some examples from library routines.

Reviews and surveys

Computerised library services in Pakistan have not been reviewed much in the literature of library science. Two review articles have recently been written by

the author. Reviewing 97 articles on Pakistani librarianship published in library journals outside Pakistan, Khalid (1996f) finds only eight articles on the topics of information technology and library automation. In another article, Khalid (1996e) reviews the literature on Pakistani librarianship published since 1990. Of the 62 items reviewed, 15 are on information technology.

A survey of computerised library services has not been conducted so far at a national level. However, Maqsood (1993) surveyed 95 libraries which use computers in the cities of Islamabad and Rawalpindi. The majority have IBM-compatible personal computers, and most libraries concentrate on cataloguing and acquisition. Staff trained in library automation work in only 39 per cent of institutions. Haroon (1995) surveys the status of library automation at Lahore, where out of 40 automated libraries, 19 are specialist, 15 are academic and six are public. CDS/ISIS is generally used for automation, and most of the libraries have automated their cataloguing functions. Sadiq (1994a) lists 23 automated libraries throughout the country using the respective software.

Najaf (1995) points out that only five universities use computers in their libraries: three agricultural universities and two private university libraries, using CD-ROM databases. In a survey of 15 university libraries, Yaqub (1990) finds only three which have computers. Javed and Meer (1990) surveyed 51 agricultural libraries and described the automation activities of four of them: the National Agricultural Research Centre, Islamabad; NWFP University of Agriculture, Peshawar; Sind University of Agriculture, Tandojam; and NADLIN, Islamabad. In a public library survey of the Punjab province conducted by Taj (1990), only three libraries (Quaid-e-Azam Library, Lahore; Dyal Singh Trust Library, Lahore; and Jinnah Public Library, Gujranwala) were reported to use computers for cataloguing. According to Anjum (1990), six out of 15 medical libraries have computers, later updated by Sukhera (1992) to seven.

Information technology

Computer hardware

Physical equipment is the major component of a computing system. In his book, Riaz (1991), presents a detailed picture of computer hardware. He describes central processing units, input/output devices, and generations and types of computer. Ayub and Ghazanfar (1994) also discuss hardware in detail. They describe computer architecture, memory and input/output/auxiliary storage devices. Computer classification by system as analogue, digital, or hybrid, and by size as main frame, mini and microcomputer are also given. Liaqat (1994) discusses input devices, processing and output devices. Javed (1992) explains local area networks, particularly for microcomputers. The advantages of LAN include sharing information, programs and hardware and sending messages, while expansiveness, complexity and network dependence are the disadvantages.

Communications technology

Riaz (1991) describes telecommunication technology such as online versus off-line communication, time-sharing systems, transmission media, cable television, telecommunication networks, packet-switching technique, LAN, videotext, teletext, telefacsimile, microfacsimile, teleconferencing, confravision, electronic mail and satellite communication. Ayub and Ghazanfar (1994) also include a chapter on telecommunication in their book.

Nasreen (1993) discusses the techniques of time-sharing. Akbar (1993) discusses the development of telecommunication technology in Pakistan. About 200 cities and towns are connected with the nation wide dialling system, and about 70 countries are accessible through the automatic international subscribers dialling system. In addition, the Telephone and Telegraph Department has introduced the packet switched public data network to provide reliable and secure data communication. Sajid (1994) mentions the very first bulletin board system named 786BBS which is based in Karachi. Areola (1995) lists the companies which are providing e-mail and Internet facilities. These include Digicom, which provides e-mail to more than 500 users in Karachi. IMranNet provides services in Karachi, Lahore, Islamabad and Peshawar. EduNet, maintained by the UNDP's sustainable development networking programme, provides access to a wealth of educational resources.

Ahsan (1995) explains how to connect to the Internet. The major institutions involved in these activities are: the National University of Science and Technology, Islamabad; Lahore University of Management Sciences; the National Institute of Electronics, Islamabad; the Commission on Science and Technology for Sustainable Development in the South, Islamabad; and the Pakistan Telecommunication Corporation. The SDNP is active in spreading Internet literacy. The author has also given a list of e-mail and Internet providers in Pakistan with their prices. Salam (1996, 1996a) presents a detailed discussion on the use of Internet in libraries.

Library software

Software is the most important item in the automation process. A computer without software is like a library with neither books nor librarians. Riaz (1991) and Ayub and Ghazanfar (1994) include chapters in their books on software. They discuss types such as language software, operating systems, utilities, and application software. While describing the library software Riaz (1991) mentions DOBIS/LIBIS, NOTIS, Virginia Tech. Library system, and Maggie's Place.

Pak Book Corporation has developed a user-friendly library package which includes inventory control, acquisition, cataloguing, circulation, serials control and information retrieval. According to Khalid (1995c), this software was not popular among Pakistani libraries and was thus discontinued. Foreign software used includes dBase, Foxpro, INMAGIC and CDS/ISIS. Examples of local software are KITABDAR and LAMP. Naqvi (1993) describes the features of CDS/ISIS and gives a sample application of the software. Khalid (1993) discusses

the new features of CDS/ISIS which have been introduced in Version 3.0, a LAN version. Khalid (1995b) states 29 reasons for using CDS/ISIS in Pakistani libraries. Hanif (1993) compares CDS/ISIS with INMAGIC in features such as specifications, indexing, deferred indexing options for maintenance, input/output, data validation, searching, display and many others. As CDS/ISIS is free, multilingual, convertible to MINISIS and ISIS mainframe, it is recommended as the best library software for Pakistani libraries.

Sattar and Sajjad (1992) evaluated the Pakistan Library Information Management System which was developed by local software company, System Limited, for the National Assembly Library under a USAID grant administered by the Asia Foundation. The COBOL-based program of this software package was developed on a DEC platform running in a minicomputer environment. Khalid (1996b) describes LAMP software, an integrated package developed by the NLDP with the help of the PLA. Its different modules include acquisition, cataloguing and circulation of both monographs and serials. It is the software used in the highest number of libraries in Pakistan.

Specific applications

Computers can be used in various library services. Riaz (1991) and Ayub and Ghazanfar (1994) divide these services into two categories: library housekeeping routines and information retrieval. Housekeeping routines include acquisition, cataloguing, circulation and serials control. Chishti (1989) lists the applications of microcomputers in the fields of cataloguing, circulation, indexing, reference and database searching, acquisition and ordering, administration, teaching, distribution, inventories, network, recreation, information, serial control, and many others. Iftikhar (1989) also discusses the use of computers in acquisition, cataloguing and classification, circulation, serials control, indexing, reference services, and preparing bibliographies. Taj (1995) describes computer applications in libraries as acquisition, cataloguing, circulation, establishment matters, cooperation and resource sharing.

Library housekeeping routines

Computers have been used most extensively in cataloguing library materials. Riaz (1991) includes a chapter on automated cataloguing in his book. He discusses MARC, online catalogues, bibliographic utilities, COM, OPAC, in-house automated cataloguing, and the advantages of automated cataloguing in libraries. Khalid (1991) explains the types of catalogues prepared with the help of computers, including book catalogues, card catalogues, COM, and online catalogues. Bhatti *et al.* (1987) discuss the advantages of automated catalogues and give the procedure for the conversion of manual catalogues to machine readable form.

In an Urdu textbook for graduate students, Allama Iqbal Open University includes a chapter on cataloguing and computers. Shabab (1990) includes detailed discussion on COM, online catalogues, MARC records and retrospective conversion. Another Urdu book on cataloguing, by Anis (1993),

includes a chapter on the role of computers in shared cataloguing. The author explains the concepts of CIP, MARC, CD-ROM, OCLC, RLIN and UBC. Masud (1988) outlines the steps in designing a computerised interactive book query system.

Acquisition of library materials is another important activity in a library which can be computerised. According to Khalid (1991), selection of material, bibliographic verification, ordering, budgeting and file management in the acquisition department can be computerised. Riaz (1991) further discusses the concepts of tele-ordering and the relationship between acquisition and other library sections. Khalid (1991) lists the advantages of using computers in circulation. According to Riaz (1991), maintaining borrowers' files and transactions at the circulation desk can be computerised. In her Urdu article, Nasim (1988) explains the use of computers in circulation to issue, return and reserve a book; calculate fines; and prepare statistical reports of transactions. Another area in which computers have made a significant contribution is serials control. According to Khalid (1991) and Riaz (1991), computers can handle inventory, ordering and acquisition, accessions, cataloguing and circulation of serials.

Information storage and retrieval

The impact of computers in the field of reference services and information searching appeared in the Pakistani library literature as early as 1979. Akhlaq (1979) introduces the Congressional Research Service, Lockheed Information System's DIALOG search service and the System Development Corporation's ORBIT search service. Mirza (1982) discusses the impact of computers on current affairs services, SDI, retrospective searching, and document delivery. Akbar (1988) describes in detail the computerised selective dissemination of information. He also mentions some Pakistani institutions, particularly in the field of science and technology, which provide SDI.

CD-ROM technology, invented in 1985, became popular in libraries very quickly and has revolutionised the storage and retrieval of information. Attaullah (1990) and Khalid (1995a) describe the features of CD-ROM technology, its advantages and problems for library applications. Salam (1996b) presents a more detailed description of the use of CD-ROM in libraries. Rind (1996) explains CD-ROM technology, focussing on its hardware and software and usage in the field of librarianship. According to Zuberi (1994), in August 1989, the Directorate of Scientific Information at the National Agricultural Research Centre installed a CD-ROM unit along with the AGRICOLA database. This was the first appearance of CD-ROMs in Pakistani libraries/information centres. Now more than 32 institutions in Pakistan are using CD-ROM technology for searching international databases, more than 70 are available. Most of these are on agriculture, biology and the medical sciences. But databases on other fields, such as education, economics, sociology, water resources, environment, fisheries, extension, library and information science, science and technology are also available. Encyclopaedias, dictionaries and

computer programmes are also purchased in CD-ROM format by some libraries for their reference sections. Zuberi and Bhatti (1993) give a list of CD-ROM databases available in various Pakistani libraries.

Resource sharing and library networks

One of the major advantages of computers is resource sharing and cooperation among libraries, made possible through networks. Khalid (1988) writes a comprehensive essay on this topic in Urdu, covering the uses of library networks in resource sharing, centralised processing as in cataloguing, circulation, reference and time sharing. Attaullah (1992) describes the cooperative activities among Pakistani libraries. The National Agricultural Research Centre has undertaken a programme to provide hardware and INMAGIC software to 16 agricultural libraries, in order to create a mechanism for sharing collections among the participating libraries. The NARC has also developed Foxbase software for serial holdings. This database, called the Union Database of Serials, presently provides information on the periodical holdings of about 12 libraries.

The Lahore Business and Economic Libraries Network is aimed at facilitating resource sharing among libraries in Lahore, to improve access to serials held by participating libraries and to create databases of government documents, research reports and monographs. Bushra (1990, 1990a) discusses this project, which is financed by the International Development Research Centre of Canada and the Lahore University of Management Sciences. There are nine member libraries, and computer hardware has been purchased. Librarians from member libraries have been trained in CDS/ISIS software. Two databases have been set up: SENET designed for union list of serials, and UNIC for bibliographic records. It contains 1,800 records. LABELNET played a pivotal role in introducing CDS/ISIS software to Pakistani libraries.

Nuzhat (1990) describes the activities of the National Documentation Centre Library and Information Network in the field of water resources which is funded by USAID. The others involved in NADLIN include eight institutions working in the field of water management which were provided with technical training and computers. A database of resources on water management has been developed in SCIMATE software. NADLIN plans to establish a remote sensing system via satellite which would deliver geographical information on water resources. This system will provide images and aerial surveys to national organisations to support their research results and development projects.

Techniques of library automation

The steps involved in library automation have also been discussed in the literature. Riaz (1991) writes a chapter on the planning and implementation of computerisation projects. Automated systems can be procured either as transferred or turnkey systems, or there is the third option of in-house development. System selection criteria are given, and the option of individual or integrated systems is also discussed.

The implementation process includes staff training, introduction to library users and system evaluation. Discussing the myths and realities of library automation in Pakistan, Sajjad (1993) tries to sort out the confusion about library automation in the minds of librarians. He says a badly-managed library cannot be changed by computers; they can retrieve information about documents but not provide access to the documents; library automation is not an objective in itself; just buying a computer does not constitute library automation; provision of the right hardware is only one of many prerequisites for automation projects; in-house system development is too costly for our libraries; and the training of personnel and retrospective conversion are important facets of library automation.

Anwar (1993) discusses some critical issues in the use of information technology in Pakistani libraries. According to his figures, Pakistan spends only 0.2 per cent of its GNP on research and development activities. Foreign information resources and services are expensive; it is impossible for individual libraries to be self-sufficient; national information centres should be set up; there should be coordination among libraries and information centres; a national centre for software development and training should be created; and appropriate human resources should be developed for library automation.

Johnson (1991) gives some suggestions for the sustainable development of computerised information systems: a sensible time frame; realistic cost estimates; thorough understanding of procurement and installation of hardware and software; prepare a needs assessment and set priorities for implementation; training for systems manager and information staff; document the system; and encourage competence in word-processing. To support these points, the author mentions his experiences in Pakistan, Bangladesh, Indonesia and Sri Lanka. Mujahid (1992) explains the process of hiring consultants for library automation. Various characteristics of consultants and the problems faced by libraries in hiring them are discussed in detail. Chishti (1996) describes the methods of saving information in the computer age. Security threats to information are discussed, and various information safeguards are described. Tariq (1996) gives methods of writing software documentation, e.g. programming documentation, documentation of testing, operators' manuals and procedures manual are discussed.

Activities of individual institutions

The automation projects of individual libraries, information centres and other library-related institutions feature prominently in Pakistan's library literature. The accounts of practical difficulties faced by these institutions may be helpful for others in planning for computerised services. These narratives also draw a picture of the overall library automation situation in different types of libraries. A computer centre has recently been set up in the National Library of Pakistan; a minicomputer and 12 IBM compatible microcomputers are under installation. Currently, ISBN records and the Pakistan National Bibliography are

maintained with the help of computers, and multilingual application software is under development.

Naqvi (1982) mentions two universities which have computer facilities: Quaid-e-Azam University, Islamabad, and Engineering University, Lahore. The library of the computer science department is to some extent computerised at Quaid-e-Azam University. Some years later, Hanif and Mehboob (1993) described the automation programme of Quaid-e-Azam University. The vice-chancellor instituted a Library Automation Committee, which decided to automate library functions with the NEC mainframe computer already installed in the computer centre. It has 32 terminals housed in the computer centre, teaching departments, library and offices of the university. Four terminals are planned for the library. Software for cataloguing has been developed in-house by a programmer at the university. It has been decided that ISBD/MARC II format will be used as a standard in cataloguing. The first phase of the automation project was started in July 1992 by converting the cataloguing records from cards. A team of 14 people converted 95 per cent of the data, about 55,000 records, into machine readable form.

Yaqub (1993) describes the library automation activities at Bahauddin Zakariya University, Multan, where the authorities were so anxious to introduce computerised library services that they included a purpose-built room in the design of the library building. The library purchased a Macintosh computer with a dot-matrix printer. In consultation with library experts, the hardware supplier developed appropriate software, which is still in the experimental stage. The data entry of catalogue cards is making progress, with data on about 4,000 books having been entered. Future plans include the automation of acquisition and circulation and having CD-ROM technology.

Bushra (1990b) describes the library automation experience at the Lahore University of Management Sciences, which started its library automation programme in 1986. There was no local expertise, so the librarian was sent to the USA to develop basic skills in database management. After a review of various software packages, INMAGIC was chosen for use on microcomputers (it will be upgraded to the network version in the future), and the use of barcode technology has also been introduced.

Soomro (1993) reports the automation activities of the Allama I.I. Kazi Library at the University of Sindh, which first acquired computers in 1989. The mathematics and computer science departments of the University provided staff to help in automating library procedures. An in-house library software named SINDHU has been developed to handle circulation and cataloguing, and AACR is used in cataloguing books.

The Government of Pakistan and USAID awarded a grant for library automation at the NWFP Agricultural University, Peshawar (Attaullah and Johnson, 1991; Attaullah, 1993; 1994). The computerisation started in 1987, and the library has two Zenith 386 computers, one laser printer, one dot-matrix printer, and one UPS. INMAGIC textbase software is also used. The functions of acquisition, cataloguing, serials control and circulation are carried out on

computer. CD-ROM searching in agriculture is also available in the library. Syed Babar Ali Library, Aitchison College Lahore uses Foxbase+ language and 80486 DX machine, and developed an in-house package in 1990 (Ashraf, 1996). OPAC and circulation services have been computerised, they use a XENIX operating system on the local area network, and 7,000 records of the library have been entered.

In Pakistan, most specialist libraries use computers in providing their services, owing to better financial resources and fewer bureaucratic hurdles, particularly in the private sector. The first computer was used in the Pakistan National Scientific and Technological Documentation Centre in 1964, which used the punch card system (Sherwani, 1989). Akbar (1986) describes computer use at some scientific institutes, including the Pakistan Scientific and Technological Information Centre, Islamabad, which creates union catalogues and maintains databases of scientific literature with the help of computers. PASTIC has a microcomputer 8088 with dBase software.

The Pakistan Agricultural Research Council has access to AGRIS and CARIS databases, and has a microcomputer with dBase software. The AGRIS document delivery service, content service, and current affairs service are provided via computer, and union catalogues of serials have also been maintained. The Pakistan Institute of Nuclear Science and Technology is a liaison office for the International Nuclear Information System and provides access to the INIS database. A computer printout of bibliographic descriptions and abstracts is sent to the scientists as SDI. At Pakistan Administrative Staff College, Lahore, an in-house software named PASCIMATE was developed using dBase III Plus (Chishti, 1990). The software can handle the functions of online public access catalogues, article index, printing of catalogue cards, serial control, new arrivals production, compiling bibliographies, and preparation of library bulletins. Other administrative functions such as preparing reports and statistics are also being carried out by computer. The first CD-ROM database of AGRICOLA arrived in 1989 at the National Agricultural Research Centre, Islamabad (Shaheen and Zuberi, 1990). Searching on this database is available to agricultural scientists throughout the country. At Dr A.Q. Khan Research Laboratories, CDS/ISIS has been installed in the library (Bhatti and Sultan, 1990). It has entered about half of its total documents in a database created in CDS/ISIS, and a network version is used (Sultan and Bhatti, 1992).

The University Grants Commission Library began automation in 1991 with INMAGIC software donated by NARC (Ishtiaq, 1993). At National Engineering Services Pakistan, Lahore, local software has been developed in Foxbase+ by the computer applications division (Shabana, 1993) and 80 per cent of the collection has been keyed into the computer. The new automated services include a new arrivals list, subject bibliographies and a current affairs service. The Pakistan Institute of Development Economics at Islamabad became the ISIS Resource Centre in 1979, with technical and financial assistance from the International Development Research Centre of Canada (Siddiqui, 1992). Under this project, the PIDE Library created a computerised database containing 700

records. In 1988, an IBM compatible microcomputer was purchased for the PIDE Library, and another computer was purchased in 1990 (Naqvi, 1996). The library uses CDS/ISIS and has maintained three databases. CD-ROM technology was installed in 1994 with two databases: POPIN and DAICD. The library of the Sustainable Development Policy Institute, Islamabad, has 14 databases on CD-ROM and four on diskettes (Zuberi and Salam, 1994). They developed three databases locally using CDS/ISIS software which is also used on the LAN (Zuberi and Salam, 1996).

Khalid (1996d) reports the retrospective conversion of catalogues in 14 specialist libraries, including six at legislative assemblies and some at NGOs. These libraries use LAMP software and the computerisation contract was with the PLA and the NLDP. Akhtar (1991) describes the use of information technology in medical libraries in Pakistan. The College of Physicians and Surgeons Library has been designated as the national focal point for MEDLINE and has acquired the CD-ROM disks from 1980 onwards. Abrantes *et al.* (1989) describe a microcomputer simulation of primary health care developed by the Agha Khan University, Karachi.

The automation of public libraries is less common in the literature. Quaid-e-Azam Library, Lahore, started automation in 1989 with the financial assistance of the Punjab Library Foundation (Akhtar, 1996). It established a local area network and now uses many terminals in various departments. For cataloguing books and periodical indexing, an in-house software program has been developed in dBase and Clippers. For books in Urdu, Arabic and Persian, a ready made software package called KITABDAR is being used. Programmes for the membership directory, annual stock checking, weeding/cancelling books, circulation of books and control of reports have been designed using CDS/ISIS software. In 1993 the hardware was reviewed, and some more terminals were added to the network.

The Dyal Singh Trust Library, Lahore, has a separate computer section, where KITABDAR software is used for both English and Urdu cataloguing (Atheer, 1993). Various terminals have been installed and are connected to a network. The Jinnah Public Library, Gujranwala, has developed its software locally, with 20 fields on the database (Aslam, 1990). Single, multiple and substring searches are available, and a microcomputer is also available for use by children. US-based software DATATREK has been installed in the USIS Library, Islamabad, where automation started in 1993 (Mujahid, 1994). The different modules of DATATREK include cataloguing, circulation, serials, acquisitions, OPAC, databridge, and a report generator. CD-ROM databases of 15 different types are available in the Library, which has five PCs. Library staff downloaded about 9,000 records from LC MARC tapes.

The British Council Library at Lahore has CD-ROM databases, the most useful among them being MEDLINE (Javed, 1995). In June 1995, the Council Libraries in Pakistan were connected with each other through electronic mail. The Punjab Library Foundation is one of the public library related organisations. The Foundation purchased a PC 386 and a laser printer. The

details of the grants allocated to different libraries in the province have been computerised. A directory of libraries of the country is also being compiled on this computer. The Foundation also has donated millions of rupees to various libraries for their automation projects (Taj, 1991).

Education and training

Library schools

There are six library schools in Pakistan which offer postgraduate courses in library and information science on a regular basis. As regards automation training, the condition of library schools in the country is disappointing (Khalid, 1995). According to Ilyas (1993), the concept of "information science" has so far been introduced in theory without any concrete steps towards adoption of the new technology. Hamid (1993) points out the problems in introducing courses on automation in library schools. These problems include the lack of computer hardware in the schools. The school in Karachi was the first to have a computer, followed by the school in Peshawar. The Lahore school has the highest number computers – four with its full computer laboratory. The schools in Bahawalpur, Quetta, and Hyderabad are still lacking computer facilities.

Another problem is the lack of expertise. Jalibi (1988) mentions that, when he was the vice chancellor in 1983, the first-ever computer-based laboratory in Pakistan's library schools was established at Karachi University. He also provided funds to this laboratory to develop its own programming for cataloguing and serial record control. The Department of Library Science at the University of the Punjab, Lahore, has five computers with two printers (Khalid, 1996a). A CD-ROM drive has also been installed. Six of seven faculty members are computer literate, and a course on library automation is being taught to the Masters students. Some faculty members are also undertaking library automation training offered by professional associations in various cities. Teachers contribute papers on the subject of information technology to various conferences and professional journals, inside and outside the country. Khalid (1996g) outlines some proposals to start information technology education in Pakistani library schools with no increase in costs. In addition to the usual faculty at schools, computer science teachers at the universities and working librarians can be hired for teaching library automation. At this time, all schools have at least one computer each. However, the computer laboratories of the computer science departments of the Universities and PLA Computer Training Centres can be used for practical work.

Curriculum development

Sattar (1992) reviews the coverage of information science in the curricula of six Pakistani library schools. The findings show that the topics of information storage and retrieval, and information technology are adequately covered, while information networks, electronic data processing, online searching, and implementing automated systems are covered inadequately. Microcomputer

applications are neglected in the curricula. The Board of Studies of Library Science at Punjab University approved a revised curriculum in 1990, in which the course on information science was introduced in MLIS Part I (Sajjad, 1990). Other computer-related courses, such as database design and management, networks and networking and the application of computers in library and information services, were included in Part II.

The University Grants Commission revised the curriculum of Master in Library and Information Science in 1991. One of the new course objectives was to develop understanding among students about the application of information technology for efficient organisation, storage and retrieval of information. The topics of library automation, networks and networking, and information storage and retrieval were included in the syllabus as optional courses. The provision of computing facilities at library schools was also recommended. UGC again revised the curriculum in 1995, making the course on library automation/information storage and retrieval compulsory. Other courses included resource sharing and networking, and the management of information systems. A library automation course for university teachers was recommended. A computer laboratory with 11 PCs in each department was also suggested.

Continuing education

To keep working professionals abreast of the latest in information technology, continuing education is vital. The five PLA Computer Training Centres play a pivotal role in training working librarians. These centres, with 11 IBM-compatible computers, have been set up by The Netherlands Library Development Project in the federal and provincial headquarters of the Pakistan Library Association: Islamabad, Lahore, Karachi, Peshawar and Quetta. A proposal for computer centres at Hyderabad and Bahawalpur was also under consideration but was dropped due to budgetary constraints (NLDP, 1995). The aim of the centres is to provide training to working librarians, training to students of library and information science, a place for practice and the necessary infrastructure for the library automation projects of the PLA (Khalid, 1996c). The Lahore Centre opened on 2 November 1992 (Bushra, 1993a). By January 1996 the Centre had held 13 courses in a total of 120 weeks. Out of 259 participants, 43 have been female. The centre also provides free consultancy services to libraries (Khalid, 1996d). Courses on computer basics, word-processing, spreadsheet management, database management and library automation have been conducted at the Centre (Khalid, 1995). According to the donor agency, NLDP, the Lahore Centre is functioning extremely well and is totally self-sufficient (NLDP, 1995). The PLA (1994) gives detailed information about the Quetta Centre. Sadiq (1994) mentions nine courses held at the Karachi Centre. According to Samdani (1995), 126 professionals have been trained there – 31 per cent of the total number of librarians in the city.

Other continuing education activities include courses conducted by professional associations. The PLA has arranged various courses, workshops,

seminars and lectures on the topic of library automation. The Punjab University Library Science Alumni Association has arranged three courses on the use of microcomputers in libraries (Khalid, 1995). The NLDP has invited automation experts from abroad to conduct various courses in Pakistan. Pakistani librarians have also been sent by the NLDP to The Netherlands for advanced training in information technology (Khalid, 1996c). The topic of the 15th PLA Conference in 1994 was "Information technology in Pakistan: potentials and prospects", so many papers on library automation were presented (Samdani, 1994).

Problems in library automation

Pakistani libraries face many problems in implementing computer projects. Naqvi (1982) mentions several obstacles. Computerised methods are new in this country, so working librarians have no practical experience. The large number of computer brands and languages adds to the difficulties. No professional librarian has specialised in computers, and computer personnel are not well-suited to apply computers to library operations. Computer applications for libraries are not taught at university level. The librarians, educationalists and planners are not yet interested in computers. The librarians' rigidity and conservatism are also a problem. However, the cost of computer hardware and software is the most important factor. Hassan (1994) describes some environmental constraints that influence the introduction of information technology in Pakistan. Bushra (1993) and Haroon (1996) list the issues as computer illiteracy, improper planning, lack of funds, lack of library software, lack of training facilities, retrospective conversion, lack of standardisation and quality control, bureaucratic set-up and unavailability of vendor support.

Commentary

Looking at the literature

The literature on computerised services in libraries has burgeoned in Pakistan in the last ten years. More than 80 per cent of the total literature on this topic has been published since 1990, and the volume of the literature continues to grow annually. The impression this reviewer has received is that the material is continuing to stress the importance of computer use in libraries and to emphasise that library automation is in its infancy in Pakistan. Although professionals should be aware of the importance and advantages of computer use, authors in the field of library automation should start writing on practical aspects in depth. For the most part, the literature consists of simple descriptions of automation activities in individual libraries: the majority continues to be of the "what we did, how we did it, do it, or plan to do it" type.

Publications of this sort are obviously appropriate and needed, but it would be helpful if they went beyond simply reporting what was done and how, and also reported why. Why was the project begun? What alternatives were considered and why were certain ones rejected in favour of others? Why has the project been successful (or not)? It would be very useful if authors provided

more planning and decision-making information useful to other planners and decision makers.

The literature contains no critical evaluation of automation projects. The actual effects of computers on library staff and users should have been studied. In absence of a comprehensive survey of library automation we cannot know the actual situation in the country. The literature shows that there is still little confidence about computers among Pakistani librarians. Computer illiteracy may be one of the major causes of this, as library schools are not teaching computer education properly. Another problem is the unavailability of literature on library automation in local languages. A very small amount of literature has been published in Urdu, insufficient for the students of library and information science; there should also be some monographic literature in Urdu.

Looking toward the future

A few trends appear from an overview of the literature. According to Fehmeed (1996), the information in traditional book form has been changed into electronic form. The technology has affected human behaviour to a great extent. Chishti (1994) says that information technology will continue to become more powerful, pervasive, accessible, diversified and mobile. The world will become a global village, and libraries will serve the information needs of remote users in any part of the world via telecommunication networks and information highways. Siddiqui (1992a) sees the future library as a virtual library rather than a physical collection of books on shelves. This library will be made possible with the help of computer technology. Akhtar (1990) says that people will not visit libraries to have access to information resources. The owner of a computer can have online connection to a databank and receive information at his home on his television screen. In the future information age, demand for information will increase. The information professionals of the future will be "electronic librarians" and will play a different role than at present: they will be librarians without libraries.

In Pakistan, although the pace of computer technology is slow, it has achieved the attention of policy makers. Despite of a number of problems, Pakistani libraries are going to use computer technology because it is becoming cheaper. The Pakistan government has announced computers as one of its priorities, and the telecommunication network has been made better and more reliable.

To fulfil the specific research needs of their clientele, specialist libraries will continue their commitment to automation. Once the PLA Computer Training Centres have been established and library schools have started computer education, there will be more trained library professionals who will speed up the automation process in libraries. The introduction of CD-ROM technology, and particularly the availability of CD-ROM recording technology, will make national databases and bibliographies possible. E-mail and the Internet will become popular in libraries and thus library cooperation will take place, both on a national and international scale. The sharing of resources is a key to the

reduction of overall computing costs. An additional benefit of cooperative efforts will be the continued growth of the establishment of standards for library computer technology which are, at present, not seen in Pakistan. The growth in library software/hardware providers and automation consultants will also increase the use of information technology in libraries.

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