

**THE
PROBLEMS AND PROSPECTS
OF
NEW TECHNOLOGIES IN LIBRARIES
AND INFORMATION SERVICES OF
BANGLADESH**

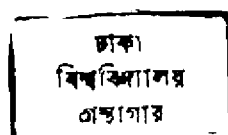
DOCTOR OF PHILOSOPHY

**BY
MD. ABDUS SATTAR**

**DEPARTMENT OF LIBRARY AND
INFORMATION SCIENCE
UNIVERSITY OF CHITRA
FEBRUARY, 1997**

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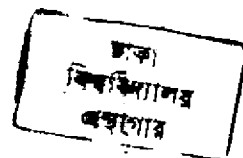
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*The thesis submitted to the University of Dhaka
in fulfilment of the requirements for the degree of
Doctor of Philosophy*

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By

MD ABDUS SATTAR



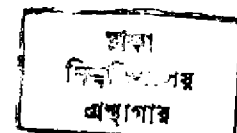
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FEBRUARY 1997

CERTIFICATE

*Certified that the work incorporated in this thesis is a bonafide work
and is carried out by Md. Abdus Sattar under my supervision.*

Hussain
(DR. SERWAR HOSSAIN) 11/3/97

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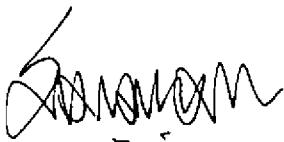


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DECLARATION

The work incorporated in this thesis has been carried out by me in the Department of Library and Information Science, University of Dhaka, Bangladesh.

The work embodied in this thesis is original and I declare that it has not been submitted in part or in full for any degree or diploma in any other university.



(MD. ABDUS SATTAR)

TABLE OF CONTENTS

List of Abbreviations		i-vi
List of Tables		vii
List of Figures		viii
Acknowledgments		ix-xii
Chapter One	Introduction	1-9
Chapter Two	Bangladesh	10-46
Chapter Three	Libraries in Bangladesh	47-97
Chapter Four	Development of New Technologies: Reference to Library Use	98-169
Chapter Five	Application of New Technologies in Libraries and Information Services in Developed Countries	170-229
Chapter Six	Impact of New Technology	230-261
Chapter Seven	Methodology	262-270
Chapter Eight	Use of New Technologies in Bangladesh	271-296
Chapter Nine	Statistical Findings of the Study	297-322
Chapter Ten	Problems of use of New Technology in Libraries and Information Services	323-335
Chapter Eleven	Recommendations	336-356
Chapter Twelve	Conclusion	357-362
Appendixes		363-416
Appendix-A	Questionnaire	364-376
Appendix-B	List of Libraries Taken as Sample for the Study	377-381
Appendix-C	Reference and Bibliography	382-409
Appendix-D	Additional Readings	410-416

LIST OF ABBREVIATION

AACRZ	Angola American Cataloging Rules-2nd Editions
AGRIIS	Agricultural information System
AHEAD	Asian Health, Environmental and Allied Database
AIC	Agricultural Information's Centre
APINESS	Asia Pacific Information Network for Social Science
ASCII	American Standard Code for Information Interchange
ASLIB	Association of Special Libraries
B.COM	Bachelor of Commerce
B.ED	Bachelor of Education
B.SC	Bachelor of Science
BA	Bachelor of Arts
BAEC	Bangladesh Atomic Energy Centre
BALICAS	Bangladesh Integrated Library and Information Centre Automation Systems
BALID	Bangladesh Association of Librarian Information Scientists and Documentatists
BALLOTS	Bibliographic Automation of Large Library Operations Using a Time Sharing System
BANBEIS	Bangladesh Bureau of Educational Information and Statistics
BANS LINK	Bangladesh National Scientific Library and Information Network
BANSDOC	Bangladesh national Scientific and Technical Documentation Centre
BARC	Bangladesh Agricultural Research Council
BBC	British Broadcasting Cooperation
BCSIR	Bangladesh Council of Scientific and Industrial Research
BEEB	Bangladesh Educational Equipment Board
BIDE	Bangladesh Institute of Distance Education
BIDS	Bangladesh Institute of Development Studies
BIRDEM	Bangladesh Institute of Research on Diseases of Endocrine and Metabolism.
BIT	Bangladesh Institute of Technology

BLC	Bangladesh Library Council
BNB	British National Bibliography
BNB	Bangladesh National Bibliography
BNR	Bangladesh National Reconstruction
BPI	Charters Bits Per Inch
BRAC	Bangladesh Rural Advancement Committee
BUETL	Bangladesh University of Engineering and Technology Library
CAN MARC	Canadian Machine Readable Catalogue
CATC	Community Antenna Television
CATSS	Computerized Online Catalogue Support System
CBMS	Computer Based Messaging System
CC	Colon Classification
CCITT	Commute Consultative International Telegraphique et Telephonique
CD-I	Compact Disk Interactive
CD-PROM	Compact Disk Programme
CD-ROM	Compact Disc-Read Only Memory
CDL	Community Development Library
CDS/ISIS	Computerized Documentation System/ Integrated Set of Information Systems
CIRDAP	Centre on Integrated Rural Development for Asia and the Pacific
CLR	Council on Library Resource, USA
COM	Computer Output Microfilms/Microfiche
CONSER	Conversion of Serials
CPL	Central Public Library
CRAM	Card Random Access Mechanism
CRT	Cathode Ray Tube
CSDC	Cooperation in Development in South Asia
dBase	Data Base
DDC	Dewey Decimal Classification
DEVINSA	Development Information Network for South Asia
DEVSIS	Development Science Information Systems
DISC	Diarrhoeal Disease Information Services Centre
DRAW	Direct Read After Write
DRTC	Documentation Research and Training Centre

E.MAIL	Electronic Mail
ENA	Eastern News Agency
EPLA	East Pakistan Library Association
ESRO	European Space Research Organization
ESRO	Europium Space Research Organization
FAO	Food and Agricultural Organization
FID	Federation International de Documentation
GDP	Gross Domestic Products
GSS	Gona Shahajjya Sangstha.
HeLLIS	Health Literature, Library and Information Service
HSC	Higher Secondary Certificate
IBM	International Business Machine
ICDDR,B	International Centre for Diarrheal Disease Research, Bangladesh
IDRC	International Development Research Centre
IFLA	International Federation of Library Associations
IIT	Islamic Institute of Technology
ILIM	Institute of Library and Information Management
INRD	Information Network on Rural Development
INTELSAT	International Communication Satellite Organization
INTELSAT	international Communication Satellite Organization
INTREX	Information Transfer Experiments
IR	Information Retrieval
ISBD	International Standard Bibliographic Description
ISBN	International Standard Book Number
ISESCO	The Islamic Scientific and Cultural Organization
ISSN	International Standard Serial Number
KWAC	Key Word Away from Context
KWIC	Key Word In Context
KWOC	Key Word Out of Context
KWUC	Key Word and UDC
LAB	Library Association of Bangladesh
LAN	Local Area Network
Lb	Pound Sterling
LC	Library of Congress

M.PHIL	Master of Philosophy
MA	Master of Arts
MARC	Machine Readable Cataloging
MEDLARS	Medical Literature Analysis and Retrieval System
MICR	Magnetic Ink Character Recognition
MULS	Minnesota Union List of Serials
NAEM	National Administration Education Management
NAIS	National Agricultural Informations System
NAPC	National Programme for Acquisitions and Cataloging
NAPE	National Academy for Primary Education
NARS	National Agricultural Research System
NASTIP	National Science and Technology information Policy
NGOs	Non-Governmental Organizations
NHLDC	National Health Library and Documentation Centre
NLM	National Library of Medicine, Classification
NSL	National Science Library
NSU	North South University
NWD	Nation Wide Dialing
OCLC	The Online Computer Library Centre
OCR	Optical Character Recognition Symbol
ODA	Overseas Development Administration
OLUC	OCLC Online Union Catalogue
OLUC	On-Line Union Catalogue
OPAC	Open Public Access Catalogue
OSTI	Office of Scientific and Technical Information, UK
OSTI	UK Office of Scientific and Technical Information
PANSDOC	Pakistan National Scientific and Technical Documentation Centre
PC	Personal Computer
PCSIR	Pakistan Council of Scientific and Industrial Research
Ph.D.	Doctor of Philosophy
PHC	Public Health Care
PIB	Press Institute of Bangladesh
PIL	Process Information List
POPLINE	Population Information Network

POPSI	Postulate based Permuted Subject Indexing
PRECIS	Preserved Context Index System
R&D	Research and Development
RAM	Random Access Memory
RCA	Radio Corporation of America
RLG	Research Library Group
RLIN	Research Library in Information Network
S&T	Science and Technology
SAARC	South Asian Association of Regional Cooperation
SAIC	SAARC Agricultural Information Centre
SDC	SAARC Documetation Centre
SDI	Selective Dissemination of Information
SDS	Space Documentation Services
SILAS	Singapore Integrated Library Automation Systems
SLIC	Selective Listing in Combination
SPS	Space Documentation Services
Sq.ft.	Square Feet
SSC	Secondary School Certificate
SSEC	Selective Sequence Electronic Calculator
STD	Subscriber Trunk Dialing
TIFR	Tata Institute of Fundamental Research
TTC	Teacher Training College
TWX	Teletypewriter Exchange Service
UBC	Universal Bibliographic Control
UDC	Universal Decimal Classification
UGC	University Grants Commission
UK	United Kingdom
UK MARC	British Machine Readable Catalogue
UN	United Nations
UNAB	United News Agency of Bangladesh
UNESCO	United Nations Education Science and Cultural Organization
UPU	Universal Postal Union
USA	United States of America
UTLAS	University of Toronto Automation Systems

VDU	Visual Display Unit
WADEX	Word and Another Index
WAN Internet	Wide Area Network Internet
WHO	World Health Organization
WLN	The Washington Library Network
WORM	Write Once Read memory
WWW	World Wide Web

LIST OF TABLES

Chapter #	Table #	Title	Page
Chapter 2	1	Present state of the communication facilities in Bangladesh	23
Chapter 2	2	Media listed newspapers and periodicals and gross circulation	25
Chapter 2	3	Number of books published by languages	25
Chapter 2	4	Different educational institutions of Bangladesh	38
Chapter 3	5	Public libraries in Bangladesh	58
Chapter 3	6	Growth of the Govt. and autonomous universities and their libraries with collections	65
Chapter 3	7	Growth of the private universities and their libraries with collections	68
Chapter 8	8	Microcomputers and minicomputers in use in Bangladesh	275
Chapter 8	9	Areas of computer used (general) in Bangladesh	279
Chapter 8	10	Microcomputer systems and software used in the libraries and information centres	281
Chapter 9	11-A	Responding libraries and use of new technologies	302
Chapter 9	11-B	Responding libraries and use of new technologies	303
Chapter 9	12	Analysis of computer used in library services	303
Chapter 9	13	Analysis of computer used in library and documentation works and services	305
Chapter 9	14	New technology used in library operations	308
Chapter 9	15	Computer used for library operations	309
Chapter 9	16	Computer used for documentation works in the library	309
Chapter 9	17	New technology used in libraries and information centres	315

LIST OF FIGURES

Chapter #	Figure #	Title	Page
Chapter 4	1	Types of information that can be included on a CD-ROM disk	127
Chapter 5	2	Facets of information technology	173
Chapter 5	3	Catalogue entry	190
Chapter 5	4	Elements of automated catalogue	191
Chapter 5	5	Elements of MARC entry	208
Chapter 5	6	Elements of automated circulation system	211
Chapter 5	7	Bar code for circulation	216
Chapter 5	8	OCR (Optical Charter Recognition Symbol) for circulation	216
Chapter 5	9	Total number of libraries in Bangladesh	265
Chapter 7	10	Representative samples of the study	266
Chapter 7	11	Number of representative respondent	301
Chapter 9	12	Percentage of representative respondents	302

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MD. ABDUS SATTAR

INTRODUCTION

CHAPTER ONE

INTRODUCTION

The libraries and information centres now are the chief instrument for accumulating and disseminating human intellectual heritage. Learning to depend on letters, man has vastly increased his effectiveness by educating himself for carrying on the civic responsibilities and enhancing his status. A man's social status and his vocational occupations are, in a large measure, limited, facilitated by his education attainments. The library is an effective institution for prolonged, systematic self-education of human being. Libraries and information centres in general have very important part to play in future development in the socio-political, cultural, educational, as well as intellectual progress in a country. The library is a social mechanism that should be the heart from which every development in the community radiates and gets irradiated.

Library started as a necessary unit in the social fabric and as a social apparatus for transferring accumulated knowledge and experience of a community or a social entity to the consciousness of living individuals. It is a "growing organism" as Ranganthan formulates, and it grew and developed as well as continued in a growing manner in particular social organization or political area to its growing and updating needs and conditions conforming to its intellectual habits. Originally, it was intended to preserve "racial memory" through books but with the progress of civilization and advances of science and technology, libraries and information centres are intended to preserve the *memory of mankind* through the compounded global store of intellectual capital consisting of all forms and types of graphic, holistic and acoustic materials, including microforms, audio-visual products and photocopies. This intellectual capital also

includes various process of new technologies and international exchange of bibliographical data.

Statement of the problem

The technology relating to library information systems and services have come into force in the information age. This technology has been given out to the different libraries and information or documentation centres in discharging their activities on information services and management. Although it is difficult for Bangladesh to cope with the fast technology due to cost effectiveness and administrative policy making, the country is not lagging far behind. Some technical terms of information processing and using as database, Microsoft windows, LAN, WAN Internet, WWW, etc. are not that much new to the information handling professional or librarians in the country. It is rather important to be familiarized with all libraries and information centres in Bangladesh.

It was almost a decade ago that the necessity of the use of new technology in libraries and information centres was felt in Bangladesh. However, these efforts were isolated, institution-based, and confined to a few person's foresight, dedication, and determination. When we look at these efforts in the light of a long span of 20 or more years, it is very disappointing compared to the situation in some of our neighboring countries. Only around 50 libraries evolved some computers and other technological systems. Due to rapid advances in computer, communication media, and related technology, libraries could not catch up with the trend. While the application and use of the new technologies in library and information service are developing at a rapid pace in other countries, we in Bangladesh, seem to be still slow due to lack of interest and initiatives for using the new technologies. Bangladesh has made a little progress in computer and telecommunication technology. We are only thinking in terms of

applying new technologies in the true sense of the term in our library. The librarians of Bangladesh have fully understood the importance and use of new technologies in efficiently discharging their professional duties. But mere wish is not enough. There are so many fundamental problems in the application and use of new technologies in libraries. These problems are found even in the libraries of developed countries relating to automation in libraries. But these problems are very acute in the libraries of Bangladesh.

These are some problems attracted me as a professional librarian in a technical university. As such I deeply engaged myself in finding out the relevant problems in the process of application and use of new technologies in Bangladesh.

For a decade or more years, I had gone through noted books and journals as well as shared the views and experiences of friends living in the developed countries. These persons had inspired me to take such an initiative and made myself interested in the subject and led me to take up this study.

As librarians are moving beyond their traditional roles as custodians of printed materials and integrating new methods of information storage, retrieval, and transmission into existing collections and services, they are, at the same time, incorporating the extensive changes that new technologies bring to organizational structures and staff responsibilities. *Cline* and *Sinnott* described the consequences of these technological changes in their book *The Electronic Library*. They stated that libraries "are being pummeled by profound and undoubtedly permanent changes. For example, the distinction between public and technical services appears to be eroding; communications within library and outside organizations are taking on a new dimensions; and new demands are being placed on professional staff. These shifts and turns moreover, are not one-time modifications to which libraries subsequently adjust,

quickly rebounding to status quo. Rather automation apparently introduces continuous change".⁽¹⁾

Libraries currently are experiencing technological changes in how services are provided and in what these services are. These changes can be attributed to three major phenomena: the information explosion, escalating library information materials costs, and the *technology revolution*. The latter is of particular interest to researcher here.

The information explosion described the consequences of an exponential growth in information. M. Palkovich reports that the knowledge base doubled between 1980 and 1988 and, it is assumed that within fifteen years, time ratio of generating of information will be reduced.⁽²⁾ The amount of materials published is now increasing at 2.5 percent each year and libraries are losing ground in the proportion of new information they are able to purchase. Studies indicate that the size of research library collections now tends to double every 16 to 20 years.⁽³⁾ It is becoming clear that individual libraries will be unable to continue to acquire materials as exhaustively as in the past and that traditional printed media will be unable to keep pace with the information being generated. Libraries are turning to new technologies as mechanism for responding to these concerns.

A second significant factor affecting libraries is escalating costs. While library collections have expanded, library costs have also risen. between 1976 and 1986, US periodical prices quadrupled and prices of hardcover books tripled. From 1968/69 to 1978/79, libraries spent 91 percent library materials, yet added 22.5 percent fewer

1. Cline, HF and Sinnot, LT. The electronic library. Lexington, MA: Lexington Books, 1983. p.172.

2. Palkovich, M. "Learning to Change: Preparing the Work Force for the Future," Speech delivered at the 8th Vocational Conference, Minneapolis, MN, August 15, 1988.

3. Hyat, JA. *University libraries in transition: responding to technological change*. NACUBO Business Officer, June 1986, 19:35-9.

books to their collections. Personnel costs increased 106 percent in the same period, yet essentially no new positions were added in academic libraries. In addition to rising costs, libraries of all types also have had to contend with diminishing levels of national support, thus attempting to maintain excellence in a climate of economic austerity.⁽⁴⁾ The bottom line is leading libraries to consider and, in many cases, implement alternatives to traditional library services and practices. *Battin* has mentioned in a study that "We are not replacing traditional services because we prefer the new gadgetry but because we no longer have the resources necessary to make the old ways effective in the current environment".⁽⁵⁾

New technological developments have already profoundly affected libraries. Almost every function carried out in a library has been altered to some extent by advances in electronics, computerization, and telecommunications. The manner in which libraries process, store, and retrieve information is changing, as is the information medium itself. The technological evolution in libraries has been called a 'quiet revolution'. According to *Becker*, it is quiet because the signs of change are subtle and not always evident; it is a revolution because the new technology will most surely affect all libraries.⁽⁶⁾ Today's libraries are in transition from manual to electronic systems. Databases are replacing card catalogues and printed indexes and abstracts. Information is being -produced and stored in new forms. The merger of computers and printing is leading to a new method of information transfers. Libraries are no longer self-sufficient but are linked through electronic networks of various types. New technologies offer viable alternatives for dealing with the information explosion and escalating costs.

4. *Ibid.* p.35.

5. Battin, P. *Libraries, computers, and scholarship*. *Wilson Library Bulletin*, April 1982; 56: 580-83.

6. Becker, J. *Libraries, society, and technological change*. *Library Trends*, Winter 1979; 27:409-17.

The changes brought about by advances in technology have been so extensive that it is difficult to assess their total effect, but it is clear that libraries are in a state of fundamental transformation. In the words of *Battin*, libraries are being "reinvented in the electronic environment".⁽⁷⁾ Indeed, the purpose of this study is mainly to help ourselves to wrestle with technology to place it in a structural framework so that it may be managed like any other resources. New technology covers a wide set of applications, from the use of new technologies, for example, a microcomputer for word processing to the operation of major library processes using microcomputer-based systems. Nevertheless, there seems to exist problems connected to application and use of new technology in the library common to a whole range of libraries in the country, which will be pointed out in the study. So in this study at first all the problems will be identified. Secondly, the necessary recommendations for remarking those problems in the application of new technologies in Bangladesh will be thoroughly analyzed and discussed. So that the librarian and information scientists in Bangladesh be benefited in using new technologies.

It is needless to say that, Bangladesh is, as one of the least developed countries introducing new technologies in this field, equipment and training along with environment and financial constraint can not be excluded. Even than, it is not wise to keep finger crossed by the country for the greater interest of easy access to the current information resources for making the education, research and development success in time.

In this view, I have decided to propose introduction of new technologies in information resources centers and libraries by identifying problems and showing the

7. Battin, P. *The library: center of the restructured university*. College Research Library, May 1984, 45:170.

future prospect, so that Bangladesh can go forward in line with fast group of computer application, information system and services including additional related technologies in spite of its present drawbacks in this field.

That's why the topic has^{been} chosen for the greater interest of the country's information system and services management.

Purpose of the Study

The purpose of this study is to examine the existing conditions of the libraries and information services of Bangladesh and to discuss reasons for application of new technologies in Bangladesh. On the other hand, the objectives of this study are to describe the problems encountered in the application and use of new technology and to consider prospects for the future of new technologies in Bangladesh .

- Specific objectives are sought to answer the following questions first:
- Why new technologies are applied in the libraries and information services of Bangladesh?
- What are the problems of the application and use of new technologies in the libraries and information services of Bangladesh? And
- What are the prospects for the future of new technologies in the libraries and information services of Bangladesh?
- The aims of the study are also to:
- get an overview of the methods and means of new technologies in library and information centres with services at the international context.
- get an idea of the developments in the new technology usage in different activities of the libraries and information services in general.

- trace the developments in application and use of new technologies in library automation in Bangladesh.
- formulate a plan of action for further developments in the use of new technology in Bangladesh in a cohesive manner .
- to urge upon the Bangladesh Government, and library and information centres, on the importance of application and the use of new technology.

Scope of the Study

The text has been organized in a logical order in the following stages including preliminaries and appendices:

The ***first Chapter*** deals with the introduction of the study which includes objectives, methodology, various sources of information, and scope of the study.

The ***second chapter*** gives the brief historical background of Bangladesh with geographical locations, climate, resources, communication systems, education, socio-economic aspects and cultural genesis of the nation.

The ***third chapter*** describes the historical growth and development of libraries as well as the existing conditions relating to use of new technologies in the libraries and information services of Bangladesh.

The ***fourth chapter*** deals with the comprehensive picture of the genesis of new technologies. This makes a survey of the technological developments in telecommunications, computers, microforms, and other new technologies with special reference to their use in library and information services in general throughout the world.

The *fifth chapter* describes the use of technologies in the acquisition, cataloguing, circulation, serial control, stock-taking systems, classification, indexing, etc.

The *sixth chapter* provides a comprehensive impact of new technologies on library character.

The *seventh chapter* prescribes the methodology of this study.

The *eighth chapter* is the heart of the study. It describes the existing situations of Bangladesh relating to use of new technologies in libraries and information services. It presents a comprehensive picture with the prospects of the use of new technologies in the libraries and information services of Bangladesh.

The *ninth chapter* describes the result of the study and prevailing situations relating to use of new technologies. This covers the details of the present study, planning, implementation of new technologies as well as the problems, exist with libraries and information centres of Bangladesh in relation to use of new technologies are concerned.

The *tenth chapter* covers data processing, analysis, presentation along with findings of the study and discussion relating to existing situation of new technologies in Bangladesh.

The *eleventh chapter* draws some recommendations in the light of prevailing situation of Bangladesh and plots a future plan, which has to suggest for an integrated nation-wide application and use of new technologies in the libraries and information services of Bangladesh.

The *twelfth chapter* is the conclusion: in this part, a quick round-up covers the new technology age in Bangladesh.

BANGLADESH

BANGLADESH ADMINISTRATIVE UNITS

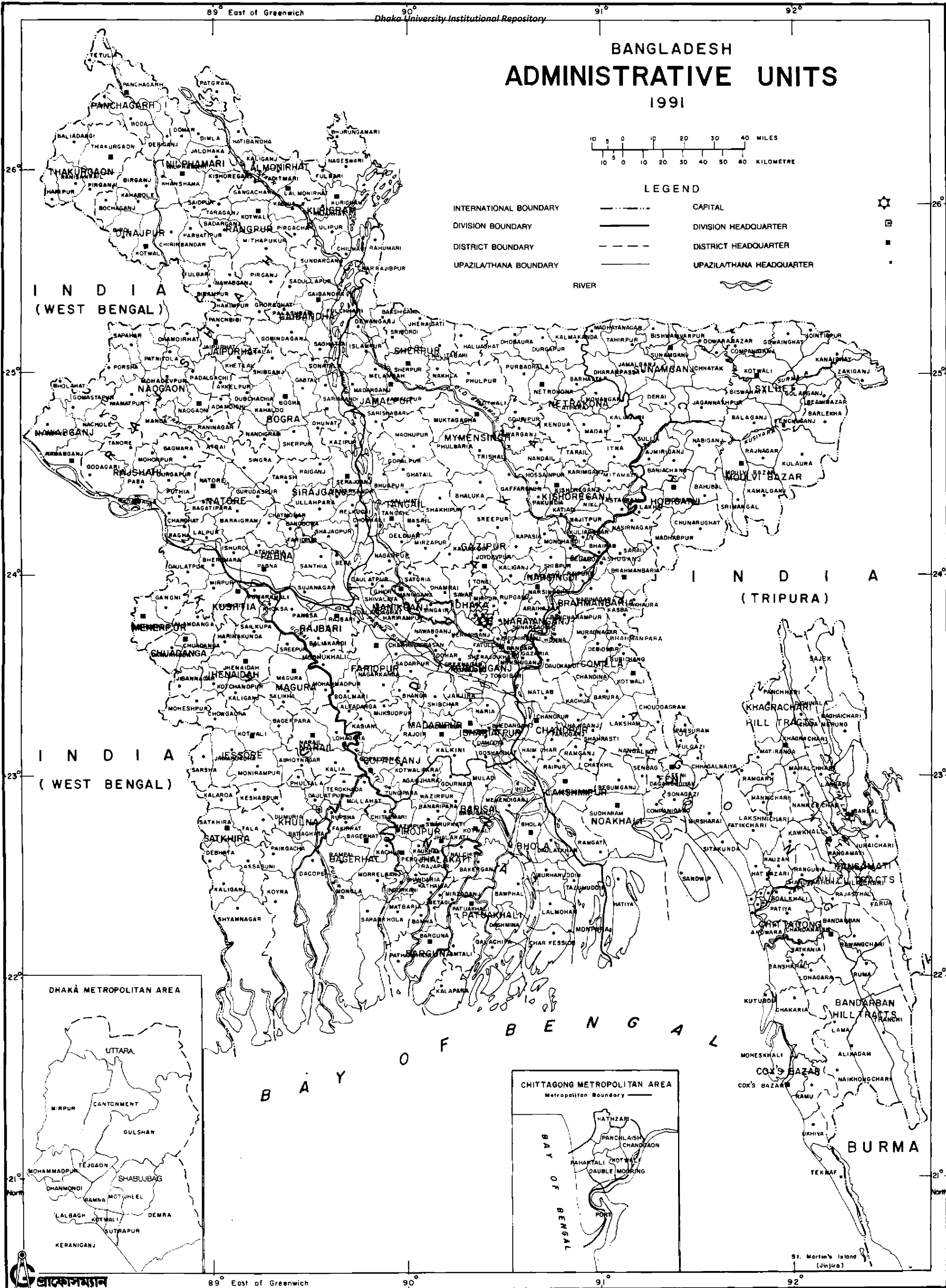
1991



LEGEND

INTERNATIONAL BOUNDARY	— · — · —	CAPITAL	★
DIVISION BOUNDARY	— — — — —	DIVISION HEADQUARTER	□
DISTRICT BOUNDARY	- - - - -	DISTRICT HEADQUARTER	■
UPAZILA/THANA BOUNDARY	— — — — —	UPAZILA/THANA HEADQUARTER	•

RIVER



CHAPTER TWO

BANGLADESH

According to *Ain-e-Akbari*⁽¹⁾ ancient name of this area now called Bangladesh was *Banga*. During the British period the Bengali spoken area of this region became a province and was called Bengal. “The English word Bengal is an anglicized form of *Bangala*, often contracted to *Bangla*. *Bangala* or *Bangla*, and *Banga* (or *Vanga*) were first officially introduced by the *Muslims*”⁽²⁾ and “have been the country's names ever since the days of Muslim rule, though *Vanga* originally denoted East Bengal, particularly the modern Dhaka and Faridpur districts”.⁽³⁾ “From the time of Sultan Ghiyasuddin Balban (1260 AD) the name *Banglah* came in use”.⁽⁴⁾ “During the era of Sultan Shamsuddin Ilyas Shah (1342-57) the territories ranging from *Taliagarhi* (north-west of *Rajmahal* was followed one of the branch rivers of the *Ganges* in the north to the sea) to Chittagong and from the foot of the *Himalayas* to the Bay of Bengal were integrated into one unit, *Banglah* or *Bengal*”.⁽⁵⁾ “The land is shaped by the two great rivers, the *Ganges* and the *Brahmaputra*,

1. *Ain-i-Akbari*, a book written by Abul Fazl-i-Allami, historian, military commander, secretary, and theologian to the Mughal emperor Akbar. It was his great achievement; a history of Akbar and his ancestors. *Ain-e-Akbari* of Abul Fazl Allami, was translated in English by H.F. Blochmann, and H.S. Jerrett in 1927-49. *Ain-i-Akbari* is in three parts: (1) a manual of government operations ranging from the jewel office and elephant stable to the army and tax collection; (2) a description and short history of Akbar's 12 provinces; and (3) an account of Hindu culture and sciences^(a).

A. The New Encyclopaedia Britannica. 15th edn. Chicago: Encyclopaedia Britannica, 1993.v.14:46.

2. Haq, Muhammad Inamul. Muslim Bangla sahitya. Dhaka: Pakistan Publications, 1965.p.1-2.

3. Grierson, G.A.comp.& ed. Linguistic survey of India. v.5. pt.1: specimens of the Bengali and Assamese languages. Calcutta, Office of the Superintendent, 1903. p.13

4. Abdur-Rahim, Muhammad. Social and cultural history of Bengal.v.1:1201-1576. Karachi: Pakistan Historical Society, 1963. p.3.

5. *Ibid.* p.5-6.

which join in central Bangladesh to become the *Padma*. They are the greatest of series of rivers winding down to the *Bay of Bengal*. This region has always been isolated from the north Indian plain. In early times eastern Bengal was called *Vanga*, while western Bengal was known as *Gauda*".⁽⁶⁾

According to the "*Aryannak Brahmin* and the religious books of Buddhist, Bangladesh is one of most ancient inhabited areas of the subcontinent. During the ancient *Hindu* period this area was split into different regions such as *Gour*, *Pundra* and *Barind* on the north, *Rahr* and *Tabbralipi* on the west and *Banga*, *Samatata*, *Harikel* and *Bangal* on the south and the east".⁽⁷⁾

The territory constituting Bangladesh was under the Muslim rule for over five and a half centuries from 1201 to 1757 AD Subsequently, it was under the subjugation of the British after the defeat of the last sovereign ruler, *Nawab* Sirajuddowla, at the battle of Plassey on fateful day of June 23, 1757.⁽⁸⁾ The British ruled over the entire Indian sub-continent including this territory for nearly 190 years from 1757 to 1947.⁽⁹⁾ During that period Bangladesh was a part of the British Indian provinces of Bengal and Assam. Assam was made a separate province in 1874. In 1905, largely at the initiative of the Viceroy, Lord Curzon, two new provinces were created: Western Bengal, with Bihar and Orissa, and Eastern Bengal and Assam. The division, made on a geopolitical rather than a avowedly communal basis, followed one of the branch rivers of the *Ganges* from *Rajmahal* in the north to the sea. It gave Eastern Bengal, with its capital at Dhaka, a population of 31 million, all but 6 million being Bengalis.⁽¹⁰⁾ With termination of the British rule in 14 August, 1947

6. The New Encyclopaedia Britannica. *op.cit.* p.717.

7. Bangladesh Bureau of Statistics. Bangladesh population census 1991: union statistics. Dhaka: BBS, 1993.p.1.

8. Encyclopaedia Britannica. *op.cit.* p. 718.

9. *Ibid.*

10. *Ibid.*

the sub-continent was partitioned into India and Pakistan.⁽¹¹⁾ In 1947, the Muslim dominant areas of the then Bengal province were constituted into East Pakistan with headquarters at Dhaka.⁽¹²⁾ Bangladesh was then part of Pakistan and was known as East Pakistan.⁽¹³⁾ Later on, it was renamed within 24 years from August 14, 1947 to March 25, 1971 while “the declaration on independence on 26 March initiated the beginning of Bangladesh, and the end of united Pakistan”.⁽¹⁴⁾ It appeared on the world map as independent and sovereign state on December 16, 1971 following the Victory at the *Mukti Judha (War of Liberation)* from March 25 to December 16, 1971.⁽¹⁵⁾

According to the constitution⁽¹⁶⁾ passed by Constituent Assembly of Bangladesh on November 4, 1972, Bangladesh is a unitary, independent, sovereign republic to be known as গণপ্রজাতন্ত্রী বাংলাদেশ⁽¹⁷⁾ (*Ganaprajatantri Bangladesh*) in its official language and in original script or, People's Republic of Bangladesh in English version. The National Government of Bangladesh is of a unitary form mainly due to the compact geographical nature of the territory and the homogenous nature of its society. The governmental form that emerged is the synthesis of parliamentary and presidential form. The homogenous nature of the society and low literacy rate were also factors in having unicameral legislature:committee system in the parliament was also introduced in order to ensure responsiveness of the government to the people. Initially the four state principles as enumerated in the 1972 constitution

11. Khan, Amanat Ullah. *Entrepreneurial process in Bangladesh*. Dhaka: Urban Studies Programme, 1996. p.47.

12. Negi, SS. *Forestry in SAARC countries*. Delhi: Periodical Experts Book Agency, 1992. p.1.

13. *The New Encyclopaedia Britannica. op.cit.*

14. Mallik, AR and Husain, Syed Anwar. Political basis of Bengal nationalism. *In: History of Bangladesh: 1704-1971. Vol: political history*, ed. by Sirajul Islam. Dhaka: Asiatic Society of Bangladesh, 1992. p.573.

15. *Statistical yearbook of Bangladesh: 1993*. Dhaka: BBS, 1994. p.3.

16. *The Constitution of the People's Republic of Bangladesh*. Dhaka: Ministry of Law and Justice, 1972. p.11.

17. *Ibid.* P.12.

were Socialism, Secularism, Democracy and Nationalism. But in 1979 these state principles were substituted by The principles absolute trust and faith in the *Almighty Allah*, nationalism, democracy and socialism, meaning economic and social justice together with the principle derived from them as set out in this part.⁽¹⁸⁾

GEOGRAPHICAL FEATURES

Bangladesh,⁽¹⁹⁾ a landmass of 147,998 sq. km⁽²⁰⁾ of which 8,236 sq. km is riverine and 1,71 sq. km is under forest,⁽²¹⁾ is situated between the latitudes 20° 34'n and 26° 38'n and longitudes 88° 01'E and 92° 41'E⁽²²⁾. It has common frontiers⁽²³⁾ with two countries, namely, India and Myanmar.⁽²⁴⁾ The country is bounded on the North and the West by India, on the East by India and Myanmar and on the South by the Bay of Bengal.⁽²⁵⁾

The total length of the frontier line is nearly 1700 miles, the limits of territorial waters of Bangladesh are 12 nautical miles and the area of the high seas extending to 200 nautical miles measured from the base lines constitutes the economic zone of the country.⁽²⁶⁾ Except the highly regions in North-East and South-East, some areas of

18. The Constitution of the People's Republic of Bangladesh: amended upto 28th February, 1979. Dhaka: Government Printing Press, 1979. p.5.

19. "Diodour writes that when Alexander invaded India, the greatest of the Indian nations was ... the Bengalis of those days". Mujumder, RC. ed. History of Bengal. Dhaka: University of Dhaka, 1963. p.41. "The paradise of nations in the 18th century" East Pakistan: a profile. Dhaka: Orient Longmans, 1962. p.19. *Quoted in:* Hossain, Serawr. A doctoral thesis on national plans for the library development in Bangladesh: 1947-83. Dhaka: University of Dhaka, Department of Library and Information Science, 1985. p.14-5.

20. Bangladesh population census: 1991. Dhaka: BBS, 1993. vol.11: Union statistics. p.1.

21. Meet Bangladesh. Dhaka: Department of Films and Publications, 1979. P.72. *See also:* BBS. Bangladesh population census: 1991. Dhaka: BBS, 1994. v.1: 1.

22. Twenty years of Pakistan: 1947-67. Karachi: Pakistan Publications, 1967. p.1. *See also:* Nafis Ahmed. An economic geography of East Pakistan. 2nd edn. 1968. p.2.

23. *Ibid.* p.1.

24. World Bank. World development report 1993. New York: Oxford University Press, 1993. p.200.

25. Statistical yearbook of Bangladesh 1993. *op.cit.*

26. *Ibid.*

high lands in the North and North Western part, the country consists of low, flat and fertile of the high land. A network rivers of which the *Padma*, the *Jamuna*, the *Teesta*, the *Brahmaputra*, the *Surma*, the *Meghna* and the *Karnaphuli* are important, and their tributaries numbering about 230 with a total length of about 24,140 km covering the country flow down to the Bay of Bengal.⁽²⁷⁾ Rivers are the most common place and yet a very significant feature of the physical landscape of the Bangladesh. In spite of their great numbers and variety of the rivers⁽²⁸⁾ of the country, including the ones in the two South-Western district of Chittagong and Chittagong Hill Tracts, belong to three major river systems: the *Ganges*, the *Brahmaputra-Jamuna* and *Meghna*.⁽²⁹⁾ The alluvial soil is thus continuously being enriched by heavy silts by rivers during the rainy season.⁽³⁰⁾ “Some of the biggest rivers in the world flow through the country and form the largest delta in the world. It is, therefore, quite obvious that monsoon rains, the rise and fall of rivers levels, floods, alluvion and deluvion and changes in river courses from the substance of both cultural and physical geography of the area”.⁽³¹⁾

With about half the surface of the country below the 25⁰ contour line, Bangladesh is generally described as a delta or as a flat alluvial plain, albeit physiography presents considerable regional variety. Geologically speaking, the land⁽³²⁾ can be divided into these broad categories of physiographic regions. These are the Tertiary Hills, the pleistocene up lands and the recent plains. The territory Hills can be found in the Chittagong Hill Tracts⁽³³⁾ region in the South East, the only region in the country that experienced upheaval contemporaneous with the Himalayan

27. *Ibid.*

28. Encyclopedia of the Third World. London: Mansell Publishing, 1982. v.1:125. 29. *Ibid.* p.126.

30. Statistical yearbook of Bangladesh 1993. *op.cit.* p.1.

31. Rashid, Harun Er. Geography of Bangladesh. 2nd rev. Edn. Dhaka: University Press, 1991. p.1.

32. Meet Bangladesh. *op.cit.* p.14.

33. *Ibid.*

Orogeny. Formed mainly of sand-stones and shales, the average height of the hills⁽³⁴⁾ is around 1000 the highest peak being *Mowduk Mual* (3292') on the Bangladesh-Burma boarder. Marshes are fairly numerous in Bangladesh and are found in many areas. There are, however, three areas of major concentration: to the South-West, to the North-East, and to the North-West of the country. The whole country looks like "Landscape with its ever green shrubbery and bamboo thickets, stretching play about in unison with nature".⁽³⁵⁾ Heavy monsoon rain fall⁽³⁶⁾ in Bangladesh coupled with its location at the lower most of three mighty river systems, which drain a vast wet basin and low attitude of major parts of the country, among others, make floods an annual phenomenon here. In Bangladesh, major parts of the country are vulnerable to floods.⁽³⁷⁾ Floods occur most frequently in the regions in proximity to the confluence of the big rivers and along their banks. Floods are less frequent, for obvious reasons, in the areas of relatively higher attitudes. Floods are infrequent also in the western part of deltaic Bangladesh. The climate of Bangladesh⁽³⁸⁾ is characterized by high temperatures, heavy rainfall, often excessive humidity and fairly marked seasonal variations. However, it is generally described as tropical monsoon. It is characterized by cool winter, warm to hot summer, heavy summer rainfall, and occasional storms and cyclones. Bangladesh also enjoys generally a sub-tropical monsoon climate.⁽³⁹⁾ While there are, traditionally, six seasons in the Bengali year,⁽⁴⁰⁾ namely *Grishmi* (March-

34. Khan, F. Karim. An introduction to economic geography Dhaka: Age Publications, 1963. p. 513-7.

35. Hossain, SS. East Pakistan: a profile. Dhaka: Orient Longmans, 1962. p.1.

36. Spate, OHK, Leamouth and Farmer, BH. India, Pakistan and Ceylon: the region. London: Methuen, 1960. p.573-6.

37. Rashid, H. East Pakistan: a systematic regional geography and its development planning aspects. Lahore: SK Ghulshan Ali, 1965. p 2-3. *See also*: Webster's New Geographical Dictionary, 1977. P.114.

38. Rashid, Harun Er. *op.cit.* p. 74.

39. Tayyeb, A. Pakistan: a political geography. London: Oxford University Press, 1966. p.12-3. *See also*. Khan, F. Karim. *op.cit.* p. 484-88.

40. Rashid, Harun Er. *op.cit.* p.90.

April: Summer), *Barshi* (May-June: Rainy), *Shrat* (July-August: Autumn), *Heminthi* (September-October: late Autumn), *Sheeth* (November-December: Winter), and *Basinthi* (January-February: Spring). But three namely, Winter (*Sheeth*), Summer (*Grishma*), and Monsoon (*Barsha*) are prominent. Winter which is quite pleasant begins in November and ends in February. In Winter there is not usually much fluctuation in temperature which ranges from minimum of 7.22-12.77 Celsius (45F-55F) to maximum of 23.88-31.11 Celsius (75F-85F). The maximum temperature recorded in Summer is 36.66 Celsius (98F) although in some place this occasionally rises up to 40.55 Celsius (105F) or more. Monsoon starts in July and stays up to October. Bangladesh receives heavy rainfall; except for some parts in the west, it generally exceeds 60 inches (1,500 millimeters) annually. The maximum rainfall occurs during the monsoon period, from June to September or early October.⁽⁴¹⁾ This period accounts for 80% millimeter. The maximum rainfall is recorded in the coastal areas of Chittagong and northern part of Sylhet district, while the minimum is observed in the western and northern parts of the country. Rainfall is not uniform all over the country. It varies from about 55" in the NW or Centre-West of the country to about 200" in the WE. Rains come here mostly during the June-September period with July and August experiencing the maximum. The centre North and North-eastern part of the country also get some rain during the months of April-May due to cloud-bursts usually in the afternoons. These pre-monsoon, storms are known as the *Nor Western*. November to February are practically rainfalls in Bangladesh.⁽⁴²⁾ Three distinct seasons can be easily recognized in Bangladesh. There the winter (November-December) with cool winter temperature and practically dry weather, the summer (March- May) with

41. The New Encyclopaedia Britannica. *op.cit.* p.713-4.

42. Whitaker's almanac, 1983; 115th edn. p.733.

high temperature and some rainfall followed by the summer monsoon (June-October) with fairly high temperature and rainfall.⁽⁴³⁾

PEOPLE

With a projected total population of 117.9 m in mid-1994,⁽⁴⁴⁾ Bangladesh is the eighth most populous country of the world.⁽⁴⁵⁾ She also belongs to high density area⁽⁴⁶⁾ of the surface of the globe, the average density being 1866 persons per sqm⁽⁴⁷⁾ in 1996 varies widely according to the distribution of flat land. The density is however not uniform all over the country. In a general way the high productivity of the land goes with high density. Thus the fertile flood-plains are the most density populated areas of the country.⁽⁴⁸⁾ Density is high also in and around the urban centres. The hilly regions, the forested areas and the coastal lands are less density populated parts of the country. The district of Dhaka has the highest density of 3 and half thousand per sqm with Chittagong Hill Tracts recording the lowest with 147.⁽⁴⁹⁾ In sharp contrast to all other areas of the country, the Hill Tracts and Bandarban have a population density only one-fifth of the national average.⁽⁵⁰⁾ The male population totals 47 m. the female numbering 45 m. An important demographic characteristic is the predominance of the young populations, the less than 15 years group constituting nearly 50% of the total. The structure strongly suggests a fast rising population in the next generation also. At present the growth rate stands at 2.5. It is interesting to note that at the beginning of

43. Rashid, Harun Er. *op.cit.* p.79-85.

44. World Bank. World development report:1996. Washington, DC: World Bank, 1996. p.188.

45. *Ibid.*

46. Ali, K. Bangladesh: a new nation. Dhaka: Ali Publications, 1982. p.270. *See also.* Summary report of the 1977 land occupancy survey of rural Bangladesh. Dhaka: BBS, 1978.

47. The New Encyclopaedia Britannica. *op.cit.* p.714.

48. *Ibid.*

49. The New Encyclopaedia Britannica. *op.cit.* p.715.

50. BBS. Statistical yearbook of Bangladesh: 1994. *op.cit.* p.xxv.

the century the rate was merely 0.94. Even during the inter-censal period, 1951-61, the growth rate of the population was 1-95.⁽⁵¹⁾ The vast majority of the peoples are Muslim. They constitute 87% of the total. The second important religion groups, the Hindus, number 12.1%, Christians (0.3%), Bhudhists (0.6%) and others (0.3%).⁽⁵²⁾

“Bangladesh is a melting pot of races”.⁽⁵³⁾ Historically, Bengalis are an admixture of various races, and held by the historians and ethnologists as the descendants of Mongolians, Dravidians, Kols, Aryans, Arabs, Turks, Afghans and Iranians.^(54,55,56) Several tribes⁽⁵⁷⁾ are found in the peripheral areas of Bangladesh. Most of them inhabit the forested hill regions of the Chittagong Hill Tracts. The foothills to the North of the country and certain parts of North-Western region also have a sizable number of them. Numerically, the *Chakmas*, the *Moghs*, the *Shantals*, the *Rajbanshis*, the *Garos* are more important than other tribes like the *Tipras*, the *Mundas*, the *Kochas*, the *Khasias*, and the *Morangs*. There are other still smaller communities of tribesman. In total, all the tribes however number only slightly over 600 thousands. The population of the country is predominately rural with only 19.63% being closed as urban in 1991.⁽⁵⁸⁾ Of the 19.63% of urban population 11.01% live in Municipal areas and 8.62% live in other urban areas.⁽⁵⁹⁾ These rural communities⁽⁶⁰⁾ live in villages spread all over the country. The people of Bangladesh are, however, known to possess a very independent temperament and

51. Rashid, Harun ER. *op.cit.* p.433.

52. BBS. Preliminary report of Bangladesh population census: 1981. Dhaka: BBS, 1984. p.6.

55. The New Encyclopaedia Britannica. *op.cit.* p.715.

54. Haq, Muhammad Inamul. *op.cit.* p.3-4.

55. Fazl-i-Rabbi, Khondkar. The origin of Mussalmans of Bengal. 2nd edn. Dhaka: Society of Pakistan Studies, 1970 (1st edn. was in 1895). p.36,74,80-6,90.

56. Roy, Niharranjan. *Bangalir Itihas: adi parba*. Calcutta: *Lekhok Samabay Samity*, 1382 BS (1975). p.16-24.

57. Jahan, Rounaq. Pakistan: failure in national integration. Dhaka: Oxford University Press, 1977. p.14.

58. BBS. Bangladesh population census 1991. Dhaka: BBS, 1994. p.35.

59. *Ibid.*

60. BBS. Bangladesh population census 1981. Dhaka: BBS, 1983. p. Viii.

grace. A melting pot of races they represent a liberal attitude. Nature has made its people soft and yet determined. The main tenor of this nationalism can be illustrated from poster that was widely used during the tumultuous days of March, 1971; it read: "Hindus of Bengal, Christians of Bengal; Buddhists of Bengal, Muslims of Bengal-we are all Bengalis".⁽⁶¹⁾ They love their country intensively, they sing "*My golden Bengal I love thee*".⁽⁶²⁾

ADMINISTRATION

The constitution of Bangladesh provides for a unicameral legislature which is called *Jatiya Sangsad* or Parliament.⁽⁶³⁾ It consists of 300 members⁽⁶⁴⁾ directly elected by adult franchise. The members of *Jatiya Sangsad* elect another 30 female members.⁽⁶⁵⁾ As such the total number of members of *Jatiya Sangsad* comes to 330. Election to the Seventh *Jatiya Sangsad* was held on 14 May 1996.⁽⁶⁶⁾ The *Jatiya Sangsad* elected the President and the country regained parliamentary Democracy. *Jatiya Sangsad* is the national parliament and is vested with all powers under the constitution to make laws for the country.⁽⁶⁷⁾ The Republic comprises three basic organs:⁽⁶⁸⁾ 1. The Legislature, 2. The Judiciary, and 3. The Executive.

"Bangladesh is governed by a parliamentary form of government. The Prime Minister is the chief executive of the state. He/She has a council of ministers who

61. Mallick, AR and Husain, Syed Anwar. *op.cit.* p.573.

62. Tagore's lyrics in Bangla "*My golden Bangla, I love thee*" was accepted as the national anthem of the Republic of Bangladesh is the first ten lines of "*Amar Sonar Bangla*".^(A) As quoted in the Constitution of Bangladesh. *op.cit.* p.11.

63. The Constitution of Bangladesh. *op.cit.* p.29.

64. BBS. Statistical yearbook of Bangladesh 1995. *op.cit.* p.xxv.

65. *Ibid.*

66. Bangladesh Gazette: 16 June, 1996. Dhaka: Election Secretariat, 1996.

67. The Constitution of Bangladesh. *op.cit.* p.22.

68. Statistical pocket yearbook. Dhaka: BBS, 1996. p.11. *See also:* The Constitution of Bangladesh. *op.cit.* p.22.

assist him/her duties”.⁽⁶⁹⁾ For the convenience of administration the country is divided into six administrative divisions, each placed under a divisional commissioner. Each division is further subdivided into *zilas*. The President is a titular head. He is elected by the members of the *Jatiya Sangasad* for 5 years. The President is the head of the state⁽⁷⁰⁾ and the Prime Minister is the head of the Government.⁽⁷¹⁾ There are now 36 Ministries and 50 Divisions. On the recommendation of Prime Minister the President appoints Ministers, State Ministers and Deputy Ministers.⁽⁷²⁾ The permanent officer-in-charge of the Ministries/Divisions is designated as Secretary who belongs to Bangladesh Civil Service.

After the administrative re-organization carried out in 1991 the country was divided into 64 *zilas*.⁽⁷³⁾ The newly created *zilas* are basically former subdivisions. The administration of *zila* is leaded by a deputy commissioner, who is assisted by other officials.⁽⁷⁴⁾ Again each *zila* consists of several *thanas* which were formerly known as Police stations. There are 490 *thanas* including river and railway police stations of which 30 are in metropolitan cities.⁽⁷⁵⁾ Under the reorganized set-up *thana* is the focal point of public administration in the country.⁽⁷⁶⁾ Each *Thana* is headed by an elected chairman. He is assisted by the *Thana Nirbahi Officers*, who is the chief executive officer and other officers. There are 4,405 *Union Parishads*, 107 *Municipalities* and 86,030 villages.⁽⁷⁷⁾ Local government in urban and rural areas is entrusted to bodies elected by the people. Such bodies in the urban areas

69. Statistical yearbook of Bangladesh 1995. *op.cit.*

70. The Constitution of Bangladesh. *op.cit.*

71. *Ibid.*, p.23.

72. *Ibid.*

73. BBS. Statistical yearbook of Bangladesh: 1995. *op.cit.*

74. *Ibid.*

75. *Ibid.*

76. *Ibid.*

77. BBS. Bangladesh Population census: 1991. *op.cit.* p.xi.

are called Municipalities or *Pourashavas* and in rural areas these are called *Union Parishad* (Union Council). There are also *Zila Parishad* and *Thana Parishad* at the *Zila* and *Thana* levels respectively.⁽⁷⁸⁾

TRANSPORT

Transport on the one hand acts as a catalyst in the socio-economic development of country and on the other, socio-economic development generates demand for transport. Therefore, an adequate and efficient transport system is the basic requirement for initiating and sustaining economic development. Transport facilities including infrastructure are adequate in Bangladesh.⁽⁷⁹⁾ The country has about 2746 kilometers of rail-road, 13627 kilometers of paved road and roughly 8433 kilometers of perennial and seasonal waterways. There are only 12.58 km of paved roads and 1.92 km of railways per 100 sqkm in the country. Side by side with the development of road transport efforts are under way to develop the water transport system.⁽⁸⁰⁾ There is no national road system as such. In fact, rivers are the life-line of the nation which provide the cheapest means of transport. Steps have been taken to put more mechanized vessels into service and modernize the existing country boats.⁽⁸¹⁾

COMMUNICATION

Communication is a necessary infrastructure for economic as well as cultural development and plays a vital role in stimulating economic growth and improving the quality of life. A smooth communication can reduce the need for traveling and

78. BBS. Statistical yearbook of Bangladesh: 1994. *op.cit.*

79. *Ibid.* p.5.

80. The forth five year plan: 1990-95. Dhaka: Ministry of Planning, 1990. p.VIII-1.

81. BBS. *op.cit.*

thus can act as a substitute for transport. Communication facilities of Bangladesh as shown in the *Table-1*, are growing stage to cope with the existing demands of developments. Telecommunication facilities in Bangladesh are not yet adequate in terms of requirements, technology and the level of services to stimulate and sustain economic growth. As per World Bank Reports⁽⁸²⁾ the telephone density in this country is only about 3.8 per 1000 population in 1995 as compared to 16 in Pakistan, 11 in India, and 10 in Sri Lanka. This figure is one of lowest in the world. The total number of post office in Bangladesh are 8805 as of 1994-95 and this is also inadequate in accordance with standard set-up by the Universal Postal Union (UPU). The UPU standard requires one post office for 3000 to 6000 population on an average. Currently in Bangladesh, one post office serves on an average, about 14185 population.⁽⁸³⁾

Table-1: Present state of the communication facilities in Bangladesh

Category	1987-88	1988-89	1989-90	1990-91	1991-92	1992-93	1993-94	1994-95	1995-96
Telephones	187650	192861	205500	223682	232700	245947	295982	391190	400400
Telegraphs	810	988	1151	1049	1058	1058	704	759	759
Post offices	7810	7882	7982	8132	8259	8312	8513	8805	8830

An extensive telecommunication system has connected the capital city with other peripheral places within the country. It is found in a statistics that in 1973-74, there were 60,000 telephones operating in the country, of which 6,000 in rural and 54,000 in urban areas. The number of telephones increased to 1,20,000 in 1979-80, of which 10,600 in rural and 1,09,400 in urban and to 1,82,000 in 1984-85 in which 26,600 rural and 1,55,400 urban. The country's telephone density, which was 1.3 per 1000 population in 1979-80, increased to 1.8 in 1984-85, 2.0 in 1990 and 3.8 in 1995. There now 4,00,400 telephones are in the country as mentioned

82. Parliament Library doc. 1996. See also: *The Bangladesh Observer*, 15 July, 1996.

83. BBS. Statistical yearbook of Bangladesh 1993. *op.cit.* p.254.

by the Minister of Telephone and Telegraph on July 1996 during first parliamentary session of the present government.⁽⁸⁴⁾ Digital electronic exchanges were installed at Dhaka, Chittagong, Khulna and Bogra to provide nationwide dialing (NWD) facilities. Twenty-six district towns were connected with NWD system by the 1984-85. On the other hand 488 telegraph offices were set-up and 410 telex/Gentex lines were commissioned till 1994-95.⁽⁸⁵⁾

The country has a network of radio and television broadcasting. The television systems was introduced in 1965. The colour television system was introduced on 1st December 1980. An extensive telecommunication system has connected the capital city with other places within the country. telecommunication systems have also been established with major cities of the world through the earth satellite ground stations at Betbonia in the Chittagong Hill Tracts and Talibabad (*Kaliakoir*) in Gazipur Zila.⁽⁸⁶⁾

Bangladesh has flourishing newspaper industry with 209 dailies, 3 half weeklies, 257 weeklies, 129 fortnightly, 91 monthlies, 7 bi-monthlies, 18 quarterlies, 3 half yearly and 8 yearly. Out of total 209 dailies, 88 are published in Dhaka, of which 72 of the dailies newspapers are published in Bengali and 16 in English (gradual development of newspaper industries from 1991 to 1995 is shown in the *Table:2*. Largest selling dailies are Daily *Ittefaq* (2,15,920), Daily *Inqilab* (1,80,100), *Banglar Bani* (1,24,230), *Dainik Bangla* (69,510), *Dainik Jano Kantha* (61,100), *Dainik Sangram* (50,960), and *Sangbad* (49,307) in Bengali and Bangladesh Observer

84. *The Bangladesh Observer*. *op.cit.*

85. The forth five year plan: *op.cit.* p.III.4.

86. *Ibid.* p.VIII.36.

(42,825), Bangladesh Times (35,110), Morning Sun (18,100), Daily Star (17,200), and New Nation (10,875) in English.⁽⁸⁷⁾ The government news agency is the Bangladesh *Sangbad Sangstha* (Bangladesh News Agency). Other agencies are the ENA, PIB, UNAB, and Media Syndicate. On the other hand, one thousand

Table-2: Media listed newspapers and periodicals and gross circulation*

Number of Newspapers and periodicals						Gross circulation (000)				
Frequency/ Language	1991	1992	1993	1994	1995	1991	1992	1993	1994	1995
Daily:	97	116	137	192	209	2215	1505	1717	2034	2250
Bengali	83	102	122	179	188	1249	132018	1515	1857	2025
English	14	14	15	13	21	966	5	202	177	225
Weekly:	231	256	243	251	257	989	974	958	1080	1140
Bengali	214	236	227	232	236	909	894	993	1015	1069
English	17	20	16	19	21	80	80	65	65	71
Monthly:	53	56	83	87	91	168	157	162	167	171
Bengali	52	53	80	83	87	167	153	154	158	169
English	1	3	3	4	4	1	4	8	9	12
Quarterly:	3	4	10	14	18	3	3	12	13	16
Bengali	3	3	9	12	15	3	3	11	12	14
English	NA	1	1	2	3	NA	NA	1	1	2

• Source: Official documents. Department of Film and Publications.

nine hundred and seventy books were published (1440 in Bengali and 220 in English and 310 in other languages) in Bangladesh in 1995.^(88, 89) A cumulative statistics of books published in Bangladesh is in the *Table-3*.

Table-3: Number of books published by languages

Year	Bengali	English	Others	Total
1980	798	171	212	1183
1981	415	57	70	542
1982	710	92	128	930
1983	446	61	109	616
1984	572	80	68	712
1985	684	76	112	870
1986	786	130	210	1126
1987	810	90	122	1022
1988	682	134	125	941
1989	1444	115	299	1858
1990	1373	114	156	1643
1991	947	58	227	1232
1992	698	40	99	837
1993	895	92	54	1041
1994	983	122	153	1258
1995	1268	140	180	1588
1996	1440	220	310	1970

87. Department of Films and Publications. Dhaka: DFP, 1994.

88. Registrar of Publications. GOB.

89. BBS. Statistical pocket yearbook: 1996/1994. *op.cit.*

CULTURE

A nation is better understood through its culture which reflects the hopes, aspirations and values of the society and cultural development is one of the indicators of overall development of a nation. Language, literature, arts and crafts, music etc. are the ingredients of culture. In the cultural fields Bangladesh occupies an important position among the countries of South Asian region. Bangladesh, has a rich cultural heritage extending over centuries. It has a rich language (*Bangla*) which belongs to the Indo-Aryan family of languages⁽⁹⁰⁾ and is the mother tongue of nearly 160 millions of people in the world, while literacy Bangla is the same all over Bangladesh, there are dialectical differences from region to region. The country also inherited a rich tradition of printing, episodes from legends, love lore and nature's beauty find expression in terra cotta pottery, clay models, handicraft and embroidery. Modern Bangladesh paintings sought and found their finest expressions in figurative works that drew inspiration from the soil and toiling masses. The works of various pioneers display appearances of boatman, fisherman, peasants, tribal women, snake charmers, herds of cattle etc.⁽⁹¹⁾

Equally varied is the tradition of music⁽⁹²⁾ that can be broadly divided into the categories-classical, folk and modern. While classical music whether vocal or instrumental has been rooted in the ancient history of the country being cultivated with patience and passion by devoted musicians over the centuries, folk music⁽⁹³⁾ has been matured through the ages by village bards in various forms such as *Bhatiali*,

90. The new encyclopedia of Britannica. Chicago: Encyclopedia Britannica, 1991. vol.2. p.690.

91. *Ibid.* p.694.

92. Meet Bangladesh. *op.cit.* p.28.

93. *Ibid.*

Baul, Marfati, Murshidi, Bhawanya, etc. Through out the history of Bangladesh its architecture⁽⁹⁴⁾ found expression in monasteries, temples, mosques, churches and tombs depicting distinctive styles and cultural influences some of the ancient monuments such as Buddhists Monastery and the *Shat Gambuj* Mosque of Bagherhat have been protected by the Department of Archaeology. The National Museum has been collecting and possessing museum objects of great values.

Culture⁽⁹⁵⁾ in Bangladesh is dominated by the middle class. Those who are very rich keep aloof, those who are very poor exert a minimal influence; and it is the educated middle class that controls as well as determines the character of the cultural life. One of the features of the cultural scene is the annual observance⁽⁹⁶⁾ of days like February 21, Twenty first of February called *Shahid Day*, the independence day (March 26), the first day of the *Bengali new year* (April 15), *Rabindranath Tagore's* Anniversary (May 9), *Nazrul Islam's* Anniversary (May 25), and the *Victory Day* (December 16). The Bengali New Year's Day however, creates the usual liveliness among the urban public. The birth anniversary of poets, Rabindranath and Nazrul Islam, are distinctive features of our cultural life. The two days are observed in the traditional way.⁽⁹⁷⁾

ECONOMY

Bangladesh is one of the least developed countries⁽⁹⁸⁾ in the world. If we take the

94. *Ibid.*

95. Haider, Mahmud. *Resurrection of Bangladesh*. Dhaka: National Book Centre, 1983. P.4-12.

96. *Worldmark encyclopedia of nation: Asia and Australia*. 1976. p.22.

97. *Meet Bangladesh*. 3rd edn. Dhaka: Department of Films and Publications, 1987. p.44.

98. *The state of world's children* : 1994. New York: UNICEF, 1994. p.85. *See also*. Muhith, AMA. *Bangladesh: emergence of a nation*. Dhaka: Bangladesh Books international, 1978. p.15-7.

countries which have more than ten million inhabitants Bangladesh is found to be the poorest among all.⁽⁹⁹⁾ Professor Dorfman of the Harvard University called it *modern economists simple mistake*.⁽¹⁰⁰⁾ The great majority of the people are engaged in traditional agricultural activities.⁽¹⁰¹⁾ Labour productivity in Bangladesh is very low because of limitedness of land and other complementary resources as well as low levels of skills. There are more than 90 millions of people in Bangladesh, the per capita income thus works out to about 220 US dollar⁽¹⁰²⁾ a year. Nearly 47% of the national out-put⁽¹⁰³⁾ occurs in the agricultural sector and about 70% of the labour force of the country are also engaged in this sector. Value added per worker is the highest in the services sectors and lowest in the agriculture sector. The country's economy is largely dominated by agriculture. Agriculture is the main occupation of the people employing 73% of the labour force. The agriculture sector contributed around 46 percent to the gross domestic products, whereas the industrial sector contributed around 12 percent of the targeted GDP.⁽¹⁰⁴⁾ The principal sources of revenue in the agricultural sector are jute, fish, and tea which accounted for about 21.9 percent of the total export earnings in 1990-1991. During 1980-1991, agricultural GDP rose by an annual average of 2.7 percent, whereas the output rose by 4.4 percent in 1992-1993. Industry, including mining, manufacturing, power and construction, contributed 16.6 percent of the total GDP in 1991-1992. During 1980-1991, the industrial GDP increased by an annual

99. The Second Five Year Plan 1990-95. Dhaka: Ministry of Planning, 1990 p 17.

100. Prof. Dorfman of Harvard University in his testimony before the house of foreign relation committee stated "from an economic point of view East Pakistan is simply a mistake". Crisis in East Pakistan-hearing before the sub-committee. House representative May 11 and 25, 1971. Washington, DC: Govt. Printing Press, 1971. p.26.

101. Muhith, AMA. op.cit. p.10-1. See also. Mujumder, R.C. History of Bengal. Dhaka: University of Dhaka, 1963. p.374.

102. World Bank. World development report: 1996. Washington, DC: World Bank, 1996. p.188.

103. *Ibid*.

104. World Bank. World development report: 1996. Washington, DC: World Bank, 1996. p.188.

average of 4.9 percent, whereas industrial production rose by 8.6 percent in 1992-1993.⁽¹⁰⁵⁾

Manufacturing sector contributed 9.1 percent of the total GDP in 1991-1992. Based on a census of establishments engaged in manufacturing (including handloom weaving), the principal branches of the sector measured by the value of output in 1987-88 were textiles (accounting for 27.4 percent of the total), food products (14.5%), industrial chemicals (10.2%), and petroleum refineries (9.3%). During 1980-1991, the manufacturing GDP increased by annual average of 2.9%. Mineral resources in Bangladesh are few. There are, however, large reserves of natural gas (17 gas fields) and deposits of coal and petroleum. Energy is derived principally from natural gas and petroleum. Imports of mineral fuels comprised about 17% of the cost of total imports in 1990.

According to the IMF, Bangladesh recorded a visible trade deficit of US\$ 1,255.9 million, while there was a surplus of US\$ 180.8 million on the current account of the balance of payments. In 1991-1992, the principal source of imports (10.5%) was Japan, while the USA was the principal market for exports (28.9%). The principal exports in 1990-1991 were ready-made garments (accounting for 51 % of the export revenue); jute and jute goods; fish and fish preparations; hides, skins and leather goods. The principal imports were: textiles and textile articles, mineral products (including fuel), machinery, mechanical and electrical appliances, and vegetable products.

105. Meet Bangladesh, *op.cit.* p.97.

For 1993-1994, taking into account both current expenses and development spending, there was a projected budgetary deficit of about 76,100 million *Taka*. Bangladesh's total external debt according to the World Bank was US\$ 13,489 million at the end of 1992, of which US\$ 12,226 million was a long-term public debt. In that year the cost of debt servicing was equivalent to 17.1% of the total revenue from exports of goods and services. During 1985-1992, the annual rate of inflation averaged 7.8%, but had fallen to about 3.0% by 1993. Remittances from Bangladeshis working abroad rose by 6.1% in 1992-1993 to reach a total of US\$ 900 million. The country's macroeconomy remains stable and healthy, with an estimated 5% GDP growth, a balance of payments surplus, and inflation under 4.5 percent. The Government hopes to boost the GDP growth from its current estimated 5% (end 1995) to an ambitious 6% in 1996. By mid-1995, the country's foreign exchange reserves stood at US\$ 3.4 billion, equivalent to about 10 months of the country's import bill. In spite of the several measures taken to make positive changes, the microeconomy remains stagnant.

Bangladesh has been heavily dependent on the international assistance of implementing its ambitious development plans. It receives annually the equivalent of 6-8% of GDP in foreign assistance. The country has been trying to make available internal resources to meet partially the cost of different development plans and projects, thereby depending less on the foreign assistance. For example, it is claimed by the Government that, in 1995, 43 percent of the total expense of the development projects is expected to be met out of the internal resources. It is indeed a positive sign of the country's economy.

In Bangladesh not only the level of income is very low, it is also unevenly distributed among the various classes of income earners.⁽¹⁰⁶⁾ The income differentials do not, however, mean that the well off sections of the population enjoyed levels of living comparable to those of the rich countries. Excepting a handful, cost of the well-off sections of the population earned only modest amounts compared to the people of the developed countries. In order to obtain a clear picture about the state of Bangladesh economy⁽¹⁰⁷⁾ various other factors must also be taken into account for a clear understanding of the structural pattern of the economy. The Bangladesh fiscal year runs from July 1st through June 30th. The national budget is prepared in two parts: the recurrent budget and development budget.

LANGUAGE

Before the advent of the Aryans in *Gaurda*, the people of *Bengals* spoke a language which was one of the Austric group of language.⁽¹⁰⁸⁾ During the Gupta reign, both *Bengals* came almost entirely under the Aryans who reduced them to an integral part of the *Aryavarta* in the literary and cultural styles.⁽¹⁰⁹⁾ In other words, Bengali language and literature in particular was *Sanskritised (Aryanised)*.⁽¹¹⁰⁾ The Buddhist scholars were the first who developed Bengali language by writing *Charyapads* in local *Buddhist-Sanskrit (Magadh-Prakrit)*.⁽¹¹¹⁾

106. Muhith, AMA. *op.cit.* p. 469.

107. World mark encyclopedia of the nation. *op.cit.* p.30.

108. Mujumder, RC, ed. The history of Bengal. Dacca: University of Dacca, 1963. p.9.

109. Gosh, (Sir) Devendra Kumar. *Prachin Bangla Shahityer Pranjal Itihash*. Calcutta: Modern book Agency, 1959. p.23. Anisuzzaman, M. Bangladesh Nationalism. In: Bangladesh politics, ed. By Emajuddin Ahamed. Dhaka: Centre for Social Studies, 1980. P.83. *See also*: Chatterji, Suniti Kumar. *op.cit.* p.3-6.)

110. Anisuzzaman, M. Bangladesh nationalism. In: Bangladesh politics, ed. by Emajuddin Ahamed. Dhaka: Centre for Social Studies, 1980. p.83. *See also*: Chatterji, Suniti Kumar. The origin and development of the Bengali language. London: George Allen & Unwin, 1970. p.3-6.

111. Ghosh. Ibid. *See also*: Chatterji, Suniti Kumar. *op.cit.* p. 79-82).

Bangla (বাঙলা) or **Bangla Bhasha** (বাঙলা ভাষা) or Bengali is the official language of the Bangladesh and is spoken by about 98% of the population.⁽¹¹²⁾ The *lingua franca* of the country, written in Bengali script from left to right with 10 vowels (8 basic + 2 joint vowels: *ai* and *au*) and 40 consonants. Bengali is also the anglicized name of **Bangla Bhasha** (the Bengali language). Broadly, it is a member of Indo-European family of languages.⁽¹¹³⁾ Bengali is the seventh most extensively spoken language after Chinese, English, Russian, Spanish, Hindi, and Arabic.⁽¹¹⁴⁾ It is a member of the Indic group of the Indo-Iranian or Aryan branch of the Indo-European family of languages. With its sister-speech Assamese, Bengali forms the easternmost language in the Indo-European. Linguistic area just as the Celtic Irish and Germanic Icelandic area are the Westernmost. It has been in existence as an independent and characterized language, or, rather, as a distinct dialect group, for nearly ten centuries.⁽¹¹⁵⁾ According to Dr. Muhammad Shahidullah, “its literary beginning has been traced as 650 AD”.⁽¹¹⁶⁾

The classical language of the Indo-European group is *Sanskrit*. The language of the outer branch, however, developed along with or even prior to *Sanskrit*.⁽¹¹⁷⁾ The evolution of the languages, as they are at present, stretches over three millennia. The original, unartificial vernacular is known as the *Primary Prakrit*. The vernacular language extricated itself out this and further evolved into the various tertiary *Prakrits*, of which the present Bengali is one.⁽¹¹⁸⁾ Marked differences can

112. Rashid, Haroun Er. Geography of Bangladesh. 2nd edn. Dhaka: University Press, 1991. p.157.

113. Shahidullah, Muhammad. Bangla bhashar itibritta. Dhaka: Bangla Academy, 1965. p.43.

114. Rashid, Haroun Er. *op.cit.*

115. Chatterji, Suniti Kumar. p.1.

116. Shahidullah, Muhammad. *op.cit.*

117. Chatterji, Suniti Kumar. *op.cit.*

118. Rashid, Haroun Er. *op.cit.* p.157-8.

be distinguished in the language in its various period and stages.⁽¹¹⁹⁾ The *Bangla script* is derived directly from *Gupta Bhrahmi* script, through *Siddhamatrika* and *Gauriya*.⁽¹²⁰⁾ Since the early sixteenth century, there have been many borrowings from European language.⁽¹²¹⁾ Along with words from European languages, there has, of course, been much borrowing from Persian and Arabic.⁽¹²²⁾ “The first *Bangla* book to have been printed was a Catholic Catechism by Francisco Fernandez, which was translated by De’ Soza. It was probably printed in 1598. The earliest known mention of *Bangla* in any European language was in the *Sylloge* of John Chamberlaene which was published in Amsterdam in 1715”.⁽¹²³⁾ It was indeed an astonishing discovery that so many languages, from Irish in the West to *Bengla* in the east, belonged to the same large family. Meanwhile the scholars of the Fort William College began the spate of printed *Bangla* books which ultimately led to the great literary works of late 19th century and early 20th century. Within Bangladesh, *Bangla* has a number of dialects. Among these speaking Bengali, there differences of dialect according to regions. The language of the newspapers and Radio-TV broadcasts is what is known as standard or literary Bengali.

There are two schools of thought regarding the origin of the Bengali Language. On examining the grammatical construction, and historical evolution of various languages of the subcontinent, the late Shahidullah,⁽¹²⁴⁾ a grammarian and a scholar of about 17 languages, as also Dr. A.B. Keith⁽¹²⁵⁾ and others have corroborated that Bengali has indeed developed from the *Banga-Kamrupi*, which, in turn, descended

119. Chatterji, Suniti Kumar. *op.cit.* 129-40.

120. Haq, Muhammad Inamul. *op.cit.* p.7-8.

121. Chatterji, Suniti Kumar. *op.cit.*

122. Rashid, Haroun Er. *op.cit.* p.159.

123. Greirson, G. Linguistic survey of India. V.1.Calcutta: 1903. *Quoted In:* Rashid, Haroun Er. *op.cit.* p.159.

124. *Ibid* p.12,24-5,31.

125. Keith, A. Berniedale. A history of Sanskrit literature. London: Oxford University Press. 1920 (1966). p.35.

from *Gaura Apabhraṃśa* or *Gaura Prakrit*, but not from *Magadhi Prakrit*. GA Grierson, Dr. Inamul Haq⁽¹²⁶⁾ and others, on the other hand, have maintained *Magadhi Prakrit* to be its origin. Both have, however, categorically rejected Sanskrit to be its origin.⁽¹²⁷⁾

The literature of Bangladesh⁽¹²⁸⁾ has a long history dating back to the early years of the century and the stages of its development coincide with an awakening of consciousness among listeners and readers the twentieth century has been a time of great and striding changes in regards them and technique, like most other modern literature. But unlike any other literature, it received a short in the arm in a late stage of its development that is, with the gaining of independence of the country from colonial powers. The freedom movement of 1971 freed none than the social and political shackles, it freed the mind of a creative race. Although the journey from 1971 to 1995 has not been long, the fruits of an unshackled imagination are already beginning to thaw.

What characterizes *Bangladeshi* literature⁽¹²⁹⁾ of today is an awareness of our own identity, a search for the self which is beginning to be recognizable, a strong urge towards innovation and breaking down of the restrictive tradition, and a predilection for constant experimentation. Our literature showed restlessness on the surface, but moved with an undercurrent of certainty, faith, belief, disbelief, doubt, rejection, acceptance, cynicism, hope—all these conflicting and contradictory trends and movements characterize our literature⁽¹³⁰⁾ at its best, which has been

126. Haq, Muhammad Inamul. *op.cit.* p. 7-8.

127. Chatterji, Sunitikumar. *The origin and development of Bengali language*. v.1: introduction, phonology. Calcutta: Rupa; London: George Allen & Unwin, 1979. p.14.

128. Bangladesh District Gazetteers. Dhaka: BG Press, 1975. p.325.

129. Jahan, Raunaq. *op.cit.*

130. *Ibid.*

seen in all these years since independence.

Bengali is used in every sphere of life; Bengali is the medium of learning and communication in Bangladesh. Bangla is the language common of Bangladeshi. In Bangladesh the concept language occupies a special position. People are proud to record that they are one of the fortunate few who have shed blood to uphold the dignity and honour of their mother-tongue. To them the perception is that the first drop to free the land was shed in 21st February, 1952 and the final drop in 16th December 1971 when Bangladesh became a free country. This shared perception of the people about their language has added a dimension to their cultural identity which is missing on other Bangla speaking people elsewhere. *Bangla* is not just a language but an element of this country's distinct identity. Devotional literature with lyrical overtones formed its basis in the middle ages. Just as *Chryapad*, a body of Buddhist mystical songs is its earliest reference the Muslim devotional literature of Daulat Kazi and Alaol form the higher peaks.⁽¹³¹⁾

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131. Meet Bangladesh. 3rd ed. *op.cit.* p.48

131. Bangladesh District Gazetteers. Dhaka: BG Press, 1975 p.325.

132. Jahan, Raunaq. *op.cit.*

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HEALTH

Since Independence, the government has been consistently pursuing a policy for providing essential minimum health care to all, particularly to those who are underserved.⁽¹³⁵⁾ Successive health plans have emphasized primary health care (PHC) as the key approach to the improvement of the health status of the people. The government of Bangladesh has accepted the declaration of the *Alma Ata Conference of World Health Organization*. "Health for all by 2000"⁽¹³⁶⁾ as the national health goal. Hospital beds have been increased significantly over the years. Efforts are still going on for further increasing the bed facilities to meet the growing demands. At present (up to June 1994) there are 919 hospitals of which Thana Health Complex and Rural Health Complex is 396; and about 35795 beds, giving a bed population ratio of 1:3288.⁽¹³⁷⁾

133. *Ibid.*

134. Hossain, SS. *op.cit.* 14-5.

135. Ministry of Planning, Planning Commission. The Fourth Five Year Plan: 1990-1995. Dhaka: Planning Commission, 1995. p. XVI-1.

136. Alma Ata. Primary health care: reporting the International Conference on Primary Health Care; Alma Ata, USSR: 6-12 September, 1978. Geneva: WHO, 1978.

137. BBS. Statistical pocketbook. Dhaka: BBS, 1996. p.6.

EDUCATION

Bangladesh possesses a rich cultural heritage. Education has always been placed in the position of high esteem.⁽¹³⁸⁾ Till the advent of British rule in India, education was taken primarily as source of social prestige. Economic objectives came into focus during the British rule. In Pakistan period, particularly in the fifties, education came to be valued not only for social and cultural development but also as an agent of economic development.⁽¹³⁹⁾ "Education is in demand in every household of the community, in all the national and international sectors of the country's economy and in all the branches of planning, research and other intellectual pursuits of society. Both at individual and nation levels, education is an item of consumption, a form of investment and an avenue of employment".⁽¹⁴⁰⁾

As the education is a major avenue of employment. In fact, it is one of the biggest consumers of its own output. Education can have a tremendous impact on technology transfers and on sectoral capital output and labour-output ratio. In a nutshell, education is the engine for socioeconomic transformation and advancement as well as the protector of human values and socioeconomic stability.

According to statement of the Minister for Education in the session of the National Parliament on 28th August, 1996, it is to mention here that the present literacy rate is 44.3% for members of the population aged 7 years and above in the country.⁽¹⁴¹⁾ However, the government have been trying to improve the situation in the field of education. Priority has been given to education through increasing allocation of resources.⁽¹⁴²⁾ The government has been adopted the policy

138. Hossain, SS. *op.cit.* 14-5.

139. Huq, M. Shamsul, etal. Higher education and employment in Bangladesh. Dhaka: University Press, 1983. p.45.

140. The fourth five year plan: 1990-1995. *op.cit.* p.XV-1.

141. Sadeque, ASHK. Minister for the Ministry of Education. Daily *Sangram*, 29 August, 1996. p.1

142. Fourth Five Year Plan: 1990-1995. *op.cit.* p.XV-11-12.

of decentralization of education to improve the existing reality. The responsibility of managing the primary schools has been vested in the local authority. However, the country has the following different types of institutes to make the educational efforts successful (*Table-4*):

Table-4: Different Educational Institutions of Bangladesh*

Sl. No.	Name of Institutions	Number
1.	Academy for Planning and Development	1
2.	Academy for Tribal Culture	1
3.	Agricultural College	3
4.	Ayurvedic College	5
5.	Cadet College	11
6.	Commercial Institute for Secretarial Training	6
7.	Dental College	1
8.	Diabetic Institute	1
9.	Engineering College (BIT)	4
10.	Homeopathic College	23
11.	Institute of Distance Education for Teacher Training	1
12.	Institute of Lib. Research and Development	1
13.	INSTITUTE of Library & Information Sc.	2
14.	Intermediate and Degree College (general)	1097
15.	Junior High School	2,750
16.	Kinder Garten School	2500
17.	Law College	32
18.	Madrasah	6169
19.	Maktab/Forkania Madrasah	58124
20.	Medical Assistants' Training School	8
21.	Medical College (Government)	13
22.	Medical College (Non-government)	4
23.	Music College	21
24.	National Academy for Primary Education	1
25.	Nizamia/Khariji/ Qaumi Madrasah	868
26.	Nursing Institute	43
27.	Pali Tols	115
28.	Paramedical Institute	2
29.	Physical Teachers Education Institute	2
30.	Polytechnic Institute	8
31.	Postgraduate medical institute	5
32.	Primary School	95,886
33.	Primary Teacher Training Centre (Non-government)	1
34.	Primary Teachers Training Institute	54
35.	Private Non-profit traders School	20
36.	Sanskrit Tols	145
37.	Secondary Education and Science Development Centre	9
38.	Secondary School	11,095
39.	Specialized College	2
40.	Teachers Training College	10
41.	Technical teachers Training College	1
42.	Technical/vocational Teacher Training Institute	2
43.	Unaini College	10
44.	University (Private)	22
45.	University (Govt. And autonomous)	12
46.	University Institute	11
47.	Vocation Training Institute	51

*Sources: University Grants Commission, BANBEIS, BBS and Directorate of Education

EXISTING SYSTEMS

Education systems in Bangladesh has been categorized under eighteen heads⁽¹⁴³⁾ which range from primary schools including kindergarten to higher education at the university level as well as variety of institutions for adult education and vocation training. These are broadly categories as: 1. Primary Education, 2. Secondary Education, 3. Madrasah Education, 4. Cadet Collages, 5. College and Medical Education, 6. University Education (General), 7. University Education (Agricultural), 8. Engineering Education, 9. Polytechnic Education, 10. Vocational Training, 11. Teacher Training (General), 12. Teacher Training (Technical), 13. Commercial Education, 14. Scholarships, 15. Mass Education, 16. Special Projects of the Ministry of Education, 17. Extra-Curricular Activities, and 18. Religious Affairs.

“The education system in general and the primary education in particular is one of the basic components of any strategy for overall social, political and economic development”⁽¹⁴⁴⁾ of Bangladesh. In order to meaningfully participate in the development process people have to be prepared in terms of skill and orientation through education. Therefore, education is a pre-requisite for successful implementation of national development programme. The education system of Bangladesh comprises 18 levels with duration of 16 years.⁽¹⁴⁵⁾ But the progress of education is growing up towards a standard. The percentage of literacy is 32.4% for population of 7 years and above.⁽¹⁴⁶⁾ But comparing to the previous years the present

143. Fourth Five Year Plan: 1990-1995. *op.cit.* pXV-1.

144. Huq, M Shamsul, etal. Higher education and employment in Bangladesh. Dhaka: University Press, 1983. p.45.

145. Firdous, Mahbub-Ul-Haque. *Primary education in Bangladesh and the draft second five year plan*. In: Bangladesh Unnayan Parishad. Development planning in Bangladesh: a review of the draft second five year plan: special publication-1, December, 1980, ed. by Qazi Kholiquzzaman Ahmad. Dhaka: Bangladesh Unnayan Parishad, 1980. p.131. *See also*: The Fourth Five Year Plan: 1990-1995. *op.cit.*

146. Bangladesh economic survey: 1991/92. Dhaka: Ministry of Finance, 1992. p.205.

rate of literacy is being increased. For example, as mentioned by Minister for Education that the 11.9% has increased between 1992 to early 1996. However, the present Government has been trying to improve the situation in the field of education. First priority has been given to education through increasing allocation of resources and money in the budget of the 1996-97. Total Taka 3952 crore⁽¹⁴⁷⁾ has been allocated for the development of primary education in Bangladesh.

Primary Education

The primary education is imparted in primary schools. Pre-primary education is offered by a 2500 private institutions,⁽¹⁴⁸⁾ mostly in the metropolitan cities, and a 58,124 mosque schools/*Forkania/Maktab Madrasah* in the rural areas. The Department of Education maintains a loose supervision over them.⁽¹⁴⁹⁾ The duration of primary education is 5 years (Grades-Class I-V), beginning at the age of 6. There are 95,886 primary schools⁽¹⁵⁰⁾ (of which 4,371 are private) in the country and secondary schools have primary sections attached to them.⁽¹⁵¹⁾ Although tuition free, primary education is yet to be made universal and compulsory, one-third of the school age children still remaining outside schools. The major problems in the areas are : a. Low enrollment ratio, particularly for girls, the enrollment ratio for girls being around 3.58%; b. Inadequate physical facilities.⁽¹⁵²⁾

147. Kibria, Shah AMS. Budget speech of the Minister for Finance for the year 1996-1997. *Dainik Janakantha*, 29 July, 1996.

148. BANBEIS. *op.cit.* p.J.

149. BBS. The forth five year plan: 1990-95. Dhaka: BBS, 1990. p.XV-3.

150. BBS. Statistical Pocket yearbook: 1995. *op.cit.* p. 299.

151. Bangladesh. Ministry of Education. Review of education and culture in Bangladesh. Dhaka: Ministry of Education, 1983. p.1

152. Bangladesh. Ministry of Education. Education Commission Reort:1974. Dacca: Ministry of Education and Cultural Affairs and Sports, 1974. P.23. *See also*: Review of the situation of education and culture in Bangladesh. Dhaka: Ministry of Education, 1983. p.1-2.

Secondary Education

Secondary education is consisted of three phases of 7 years.⁽¹⁵³⁾ While secondary education is offered in 2,750 Junior High Schools and in 11,095 (302 Govt) Secondary High Schools, the Higher Secondary Course is provided in the Intermediate sections of 346 (13 Govt.) Degree colleges 751 (204 govt.), there are 11 cadet colleges.⁽¹⁵⁴⁾ Two public examinations at the end of grade X and XII leading to the Secondary School Certificate (SSC) and Higher Secondary Certificate (HSC) respectively are conducted by five autonomous Boards of Intermediate and Secondary Education at Dhaka, Comilla, Jessore, Rajshahi, and Chittagong.⁽¹⁵⁵⁾

Higher Education

Higher education⁽¹⁵⁶⁾ includes at the post-HSC level (after grade XII) comprising the following courses: i. 2 years ordinary first Degree (BA, BCom, and BSc). ii. 3 years specialized (Honours) Degree in Arts, Science, and Commerce (BA Honours, BSc Honours, and BCom Hons). iii. 4 years professional first Degree in Engineering and Agriculture. iv. 5 years professional first Degree in Medicine. v. Master's Degree: 1 year for Honours Graduates 2 years for Non-Honours Graduates. vi. M.Phil and Ph.D Degree: 2 Years for M.Phil Degree 2-5 years for Ph.D Degree. The courses of higher education are offered by degree colleges, professional colleges and universities⁽¹⁵⁷⁾ in Bangladesh. There are 34 universities⁽¹⁵⁸⁾ in the country, of which 22 are private.

153. Bangladesh economic survey: 1991/92. Dhaka: Ministry of Finance, 1992. p.205.

154. BANBEIS. Bangladesh educational statistics: 1991. Dhaka: BANBEIS,1992. p.a-b. *See also*: BBS. Statistical pocket yearbook.: 1995. *op.cit.* p.299-301.

155. Bangladesh. Ministry of Education. Review of the situation of education and culture in Bangladesh. Dhaka: Ministry of Education, 1985. p.1.

156. *Ibid.* p.2.

157. Whitaker's almanac:1983. p.732.

158. University Grants Commission. Up to October, 1996.

One of the serious problems in the field of higher education is that its expansion during the past decades has been more or less unrelated to the manpower needs of the country and the proper growth of primary, secondary and technical education have not taken place. Recently a feeling has grown that a university is a place to keep the young people off the work market. Second, within the higher education system, there is a serious imbalance, nearly 70% of all enrollment being in the arts and humanities. Third, in spite of the high cost of university and college education, the overall performance in terms of quality and out put of this sector is poor. The dropout and failure rates in BSc, BA and BCom Honours and Pass are very high. In the outlying, most rural colleges the failure and dropout rate in BSc Honours has been recorded as high as 87%.⁽¹⁵⁹⁾

Medical Education

Five year course is offered by the medical colleges. Substantial progress had been achieved in the field of medical education. The annual intake in 19 medical colleges including newly established 3 medical colleges in Comilla, Khulna and Faridpur and one dental college in the country are 1350 and 60 with average annual output of 1000 and 46 graduates respectively.⁽¹⁶⁰⁾ As of March 1995, there were approximately 22,356 doctors against a population 114.2 million giving a doctor-population ratio of 1:5108.⁽¹⁶¹⁾

Technical Education

Technical education is organized in three tier: Certificate, Diploma, and Degree. While certificate courses, preparing skilled workers, are provided in 51 vocational

159. Bangladesh. Ministry of Education. Review of the situation of education and culture in Bangladesh. *op.cit.* p.3.

160. The fourth five year plan: 1990-91. *op.cit.* p.XI-2.

161. World Summit for Social Development. Country Paper Bangladesh. Denmark: WSSD, 1995. p.i.)

training institutes,⁽¹⁶²⁾ 3 years diploma courses in various branches of engineering and technology are offered by 22⁽¹⁶³⁾ (including 4 BIT) polytechnic and mono-technic. Degree courses are provided by 4 engineering colleges (BIT) and University of Engineering and Technology. There are 16 Commercial Institutes, 1 Glass and Ceramic, 1 Leather Technology, 1 Textile Technology, 12 Technical Training Centres, and 1 Graphic Arts institute.⁽¹⁶⁴⁾

Teacher Education

A one year certificate in education for primary teachers is currently offered by 54 Primary Training Institutes (PTI).⁽¹⁶⁵⁾ The minimum qualifications for admission is HSC for men and SSC for women. For preparing for secondary schools, 10 Teacher's Training Colleges offer the BEd course (entry requirement being a Bachelor's Degree) and two of them also provide a Master's course in Education. The Institute of Education and Research of the University of Dhaka offers a one-year Diploma in Education, two year MEd course (two years after Bachelor Degree or one year after Diploma) and there is a provision for Ph. D programme in the courses of studies need to be up dated, modernized and improved. The duration of the certificate in Education course for primary teachers has to be extended so that the quality of teachers at the basic level may be improved.

Madrasha Education

In addition to general system of education, there exists a parallel and traditional system of learning in Bangladesh since a long time, known as *Madrasha* education

162. BANBEIS. Bangladesh educational statistics, 1991. *op.cit.* p.e.

163. *Ibid.* p.e.

164. *Ibid.* p.e-f.

165. *Ibid.* p.i.

which imparts religious instruction to the Muslim students. Madrasha education, as a parallel system with main stream of education, has drawn considerable attention. The levels of this system are:

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|------|--------------------------------|----------------------------------|
| i. | <i>Ebtedayee</i> (Primary) | : 4 years course |
| ii. | <i>Dakhil</i> (Secondary) | : 6 years after <i>Ebtedayee</i> |
| iii. | <i>Alim</i> (Higher Secondary) | : 2 years after <i>Dakhil</i> |
| iv. | <i>Fazil</i> (First Degree) | : 2 years after <i>Alim</i> |
| v. | <i>Kamil</i> (Master's Degree) | : 2 years after <i>Fazil</i> |

The most serious problem in this field is that in the past the Madrashes remained outside the pale of modernizing influences, no serious attempt were made to update their academic programme and introduce science and technical subjects in their courses of studies.⁽¹⁶⁶⁾ But in view to modernizing madrasah education, a programme for introduction of science course in 200 selected non-government madrasahs costing Taka 763.08 lakh was undertaken during the Fourth Five Year Plan: 1990-1995 which was implemented under the ADB assisted secondary science education.⁽¹⁶⁷⁾

There are 15,986 Ebtedayee, 4,270 Dakhil, 798 Alim, 94 Kamil Madrasha (including 3 Govt.)⁽¹⁶⁸⁾ and 58, 124 Maktab or Forkania madrasahs⁽¹⁶⁹⁾ as well as 58,124 Maktab/Forkania madrasahs (1990), and 868 Nizamia/Khariji/Qaumi Madrashes (1990)⁽¹⁷⁰⁾ for religious education in Bangladesh.

Besides these educational systems some other religion based traditional education systems are existing in the country. These are almost like of *madrasah* education for

166. Review of the situation of education and culture in Bangladesh. *op.cit.* p.3-4.

167. Fourth Five Year Plan: 1990-1995. *op.cit.* p.XV-3.

168. Bangladesh educational statistics, 1991. *op.cit.* p.c.

169. *Ibid.* p.j.

170. *Ibid.*

the Hindus and Buddhists in the rural areas of Bangladesh. These are called Sanskrit Tolls and Pali Tols for the Hindus and Buddhists respectively.

Cadet Colleges

There are now 11 cadet colleges in the country with an enrollment of 3300, i.e. 300 students per college under a comprehensive fee exemption programme that takes due cognizance of the economic status of the student. The cadet college network is now able to widen its in-take opportunities to a large section of the society.⁽¹⁷¹⁾

Special Projects of the Ministry of Education

In the TFYP, there were some special multi-dimensional projects which functionally were not confined to primary, secondary, technical or university education as such. Administratively and operationally, those scheme were under the direct management of the ministry of Education. One of such project is the Bangladesh Institute of Distance Education (BIDE). The purpose of the scheme is to conduct school broadcasting programmes and offer audio-visual technological assistance to National Administration of Educational Management (NAEM), Teacher's Training Colleges, Primary Training Institute (PTI), and the National Academy for Primary Education (NAPE). The Bide was a SFYP spill-over project and was completed in June, 1986. It was further strengthened through a TAPP during 1987-88. As an additional output, the BIDE successfully introduced the Experimental Distance Education BEd. programme. Other examples are the Bangladesh Educational Equipment Board (BEEB), The Boy Scouts had a target of attaining a membership of about 2 lakh by the end of TFYP by expanding the

171. Fourth Five Year Plan: 1990-1995. *op.cit.*

scouting network further deep into remote rural areas. Expanded set-up of training logistics were also planned for under the project. The Bangladesh Girl Guides had also a programme to train more than 7000 girls through camps and rallies during the plan period under this project. The targets were more or less achieved.⁽¹⁷²⁾

It is evident that Bangladesh has inherited an educational system that no longer answers to the needs of its economy that reflects the hopes and aspirations of its toiling masses. The system, based on elitist philosophy, was implanted by the colonial rulers to suit their own requirements. During the last decade various attempts were made to reform the education system of the country so as to meet the needs of the nation. But progress in that direction is not so much satisfactory.

172. *Ibid.* p.XV-11.

LIBRARIES IN BANGLADESH

CHAPTER THREE

LIBRARIES IN BANGLADESH

The history of the library movement in this subcontinent can be traced from the advent of the British into this country.⁽¹⁾ "It was, however, to the credit of the British who introduced the concept of Public library as an instrument of mass education in India".⁽²⁾ The British, according to the Report of the Advisory Committee of Libraries, "came to dominate India, but they brought with them an ideology and a literature embodying the ideals of the common man with which the whole of the Europe was imbued at the time. They could not rid themselves, in India, of the ideals in which they were brought up in England. Inevitably they inspired though they may not have actually encouraged, the setting up of public libraries in this country".⁽³⁾ Thus, "the history of modern libraries does not begin before the advent of British rule in India."⁽⁴⁾ Meanwhile, "the European missionaries were, however, active in the sphere of native education and libraries. The Society for Promotion of Christian Gospel, founded in 1698, had established schools and with them libraries of modest size".⁽⁵⁾ In fact, the rise of European settlement in the 17th and 18th centuries, besides bringing great political changes and great cultural renaissance, gave a new impetus in India to library movement, which proved so revivifying and refreshing for the Indians.

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1. Misra, Jogesh History of libraries and librarianship in modern India since 1850. Delhi: Atma Ram, 1979. p.18
 2. Khurshid, Anis. *Growth of libraries in India*. **International Library Review**, January 1972, 4(1):24.
 3. India. Ministry of Education. Advisory Committee for Libraries: Report. Delhi: Ministry of Education., 1959. p.1.
 4. Khurshid, Anis. op.cit.
 5. Mukherjee, AK. Librarianship: its philosophy and history. London: Asia Publishing, 1966. p.139.

"It was the evangelical fervour of the Christian missionaries which prompted them to promote learning, introduce printing presses and establishment of libraries".⁽⁶⁾

The Society for Promotion of Christian Gospel established in 1709 the first circulating library of its kind in Calcutta.⁽⁷⁾ "These libraries were established at the centres of missionaries activities, in Bengal and South India".⁽⁸⁾ "The Society introduced mobile library in 1709 as well".⁽⁹⁾ "Occasional gifts were also made by the East India Company to fund small libraries. Fort St. George and Fort St. David libraries were the result of such gifts. By 1713 the collection of Fort St. George, mostly on divinity, was worth of £ 438.00".⁽¹⁰⁾ "The Company's interest was further evidenced in this library when in 1720 it directed the library "to sort the books into proper classes and to make a catalogue of them to be kept in the library".⁽¹¹⁾

East India Company started taking interest in education and libraries by the 1770s when it decided to support indigenous schools through grants in-aids. The Chaplin, who recognized for this library, was rewarded by Governor. The company also undertook to bring books into India through their ships.⁽¹²⁾ "The introduction of printing in 1777, was a great impetus for the proliferation of printed reading materials."⁽¹³⁾ Some important press regulations and acts enforced were: Wellesley Regulations of May 1799; Regulation of the Press Ordinance, 1823; Regulation of Printing Establishments, 1823; Press Registration of Books Act, 1867; and, an Act for the Better Control of Publications in Oriental Languages, 1878.⁽¹⁴⁾ The India Office Library and the British Museum had deposit rights under the 1867 Act and

6. Misra, Jogesh. *op.cit.* p.18.

7. Mukharjee, AK. *op.cit.*

8. Khurshid, Anis. *op.cit.* p.25.

9. Ghosh, Suchitra. *Prachin Banglar Granthagarer Itihaser Kashra: 1700-1900*. Granthagar, 1373 Asharh: 61.

10. Mukharjee, AK. *op.cit.*

11. *Ibid.*

12. Khurshid, Anis. *op.cit.*

13. Khan, MH

14. Natrajan, S. *History of the printing press in India*. Bombay: Asia Publishing, 1962 p.23.

continued to receive copies of Indian imprints until 1947.⁽¹⁵⁾ "At the beginning of the 19th century, the printing activity increased substantially".⁽¹⁶⁾ "The vogue of commercial circulating libraries went strong in the first three decades of this century. In fact, the shape of modern library movement can be seen in the first half of the 19th century. It was during that period that the public libraries were established with active support of the British at Calcutta, Madras and Bombay".⁽¹⁷⁾

Subsequently, a quarterly list of printed books entitled, 'Bengali Library Catalogues', was published and some copies of the books so deposited were given to the Calcutta Public Library⁽¹⁸⁾, which was then called the Asiatic Society of Bengal, established in 1784. It was the first library in India, which changed its name to Calcutta Public Library, the Imperial Library and finally the National Library of India.⁽¹⁹⁾

"The year 1808 was a landmark in the history of modern library movement, for in that year the Bombay Government initiated a proposal to register the libraries which would receive free copies of books published from the "Funds for the Encouragement of Literature".⁽²⁰⁾ The proposal may be regarded as the beginning of the library movement in the subcontinent. According to AK Mukharjee, it is to be said that "Governor Warren Hastings himself was its Patron. The Society was thus started much earlier than the Royal Asiatic Society of Great Britain and Ireland (1823) and had its own library".⁽²¹⁾ This Society has played a significant role in the cultural history of this area.

15. Anwar, A. Mohtaz. *Problems of public library development in Pakistan*. **Eastern Librarian**, September, 1970; 5(1):6.

16. Natrajen, S, *op.cit.* 17. Ohdedar, AK. The growth of the library in modern India. Calcutta: World Press, 1966. p.4.

18. Alam, Shah M. Nazmul. *Public library system and mass literacy programme of Bangladesh.. Eastern Librarian*, 1991; 16:22.

19. Gupta, Krishna Das. *Indian libraries: documentation and automation in library services*. **Intl Libr Rev**, 1979; 11:464.

20. Dutta, Bimal Kumar. *History of libraries and librarianship of ancient and medieval India*. Delhi: Atma Ram, 1970. p.89.

21. Mukharjee, AK. *op.cit.* p.141.

However, the public library movement in Bangladesh dates back only to the middle of the 19th century.⁽²²⁾ “The establishment of the Calcutta Public Library and the proposed depository library, were just beginning. Gradually, a library movement originated. Several Europeans and Bengalis were pioneers in this field. Mr. J. Bailey in Mednipur, the Rev. James Long in Calcutta, Gopal Lal Mitra in Birbhum”,⁽²³⁾ “Hodgson Pratt, Kalidas Mitra and Ramlochan Ghosh of Krishnanagar”⁽²⁴⁾ were prominent in the library movement of Bengal in British India. “As a result of their voluntary efforts twelve libraries were established in Mednipur, Krishnanagar, and Jessore now a part of Bangladesh by 1851”.⁽²⁵⁾ “The speeches that were delivered by the last three mentioned persons in connection with the establishment of libraries were published in a book in 1855”.⁽²⁶⁾ “This was the first publication related to librarianship ever published in the Indo-Pak-Bangladesh subcontinent. About four years before the publication of this book, in 1851, Rajendralal Mitra, editor of the *Vividhartha Sangraha*, wrote in his own journal an article on the usefulness of libraries and the ways and means by which a public library can be established by subscriptions”.⁽²⁷⁾ “This was again, the first article on libraries ever published in any periodical in this subcontinent”.⁽²⁸⁾ “Library movement once started in the presidency towns of India finally found its way to the vast hinterland of the country during the last four decades of the 19th century. By this time, all the provincial capitals and even most of the district towns of the presidencies of Bombay Calcutta, and madras had their public libraries”.⁽²⁹⁾

22. Syed, Mohammad Abu. Public libraries in East Pakistan. Dacca: Green Book House, 1968. p.1.23. Mitra, Rajendralal. *Gramya Granthalaya. Vividhartha Sangraha*, 1851; 1:6. See also: Khan, MH. *Public libraries in Bangladesh. Intl Libr Rev*, 1984; 16:127.

24. Dey, Srinath, comp. Vaktrita. Serampore, 1855. *Quoted In*: Khan, MH. *Ibid*.

25. Mitra, Rajendralal. *op.cit*. p.8.

26. Dev, Srinath. *op.cit*.

27. Mitra, Rajendralal. *op.cit*. p.6.

28. Khan, MH. *op.cit*. p.128.

29. Khurshid, Anis. *op.cit*. p.37.

Thus, this library movement, initiated jointly by the natives and the British civil servants, received much encouragement. As an output, now in Bangladesh, the Jessore Public Library was established as early as 1851.⁽³⁰⁾ "Three others, Barishal Public Library at Barishal, Rangpur Public Library at Rangpur, Woodburn Public Library at Bogra, were established by 1854. These examples were soon followed by others. As a result, many public libraries came into being in the different towns. Among them, Rajshahi (1871), Dhaka (1874), Comilla (1885), Pabna (1890), Noakhali (1897), Sylhet Price Memorial (1897), Chittagong Municipal (1904), Cox's Bazar (1906), Jessore Ram Narain (1907), Munshiganj (1908), Rangpur (1909), Kishorgonj (1909), Faridpur (1914), Kustia (1914), Khulna (1914), Mymensingh (1930), and Dinajpur (1930) public libraries are still survived".⁽³¹⁾

Now in the following pages attempts will be taken to place or state an overview of the general situation of libraries in Bangladesh. The researcher has been handicapped in this effort by the dearth of published literature on the subject. This account is therefore based on whatever limited literature the researcher was able to gain access to and on his own personal observations. Prior to independence and partition of the subcontinent in 1947, Bangladesh was part of the Province of Bengal and was generally referred to as East Bengal. It was backward in the amateur of education and library development. The western province which now constitutes the State of West Bengal, a part of India, was more fortunate in this regard and there are now many libraries in the urban and rural areas including the Imperial Library were functioning there.⁽³²⁾

Even during the Pakistan period after 1947, Bangladesh which was then called East Pakistan suffered and was neglected in the library development compared to the development of various other agencies meant for promoting social, educational and economic progress.

30. Khan, MH. Public libraries in Bangladesh. *Intl Libr Rev*, 1984; 16:128.

31. *Ibid. See also:* Syed, Mohammad Abu. Public libraries in East Pakistan: yesterday and today. Dhaka: Green Book House, 1968.

32. *Ibid.*

There were no libraries in the region except the mentioned above libraries and the library of the University of Dhaka, which could be used by the scholars and the general public of respective places.

Bangladesh has today over 3170 (including 66 Govt. District Public Library and 40 sub-centre of Community Development Library) libraries of varying sizes. They may be classified into major categories: i. Public libraries; ii. National libraries; iii. Academic libraries comprising school, college and universities; and iv. special libraries.

PUBLIC LIBRARY SYSTEM

A public library is a cultural centre disseminating human knowledge and dispensing instruction, information and recreation to the users. It is an integral part of the education system and generally called *people's university*. "The public library movement in Bangladesh dates back to the mid-nineteenth century. There is no denying the fact that the idea of establishing public libraries is essentially Western and the spread of public library movement in this part of the world is the result of the impact of British culture on our intelligentsia".⁽³³⁾ It is important to mention here that, except for the Calcutta Public Library established in 20 August,⁽³⁴⁾ 1836, all the non-government public libraries were established after 1850 in the country.⁽³⁵⁾ It is perhaps due to Public Library Act which came on 14 August 1850 in England.⁽³⁶⁾

33. Hossain, Serwar. Horns of dilemma: a paper presented at the National Seminar on Library Development Planning in Bangladesh; held under the joint sponsorship of the Sports and Cultural Division of the Ministry of Information, Broadcasting, Sports and Culture, People's Republic of Bangladesh Government and The British Council from 1st February to 4th February, 1982. p.1.

34. Rao, G. Surya and Rao, G. Babu. Library movement in India: a historical perspectives. In: Library movement and library development in India: seminar papers; Thirty Ninth All India Library Conference. Deptt. of Publications, Govt. of Karnataka, Bangalore, January 7-10, 1994. ed. by CP Vashishth. Delhi: India Library Association, 1994. p.23. *See also*: Kabir, Abdullah M. Fazle. The libraries of Bengal 1700-1947. London: Mansell Publishing, 1987. p.108-11.

35. Khan, MH. *op.cit.*

36. *Ibid.*

After partition in 1947 erstwhile East Pakistan Government made a beginning with the creation of then East Pakistan Central Public Library at Dhaka in 1953.⁽³⁷⁾ "This was followed by the launching of two more Zonal libraries at Khulna and Chittagong at the divisional head quarters in the Second Five Year Plan".⁽³⁸⁾ But it took five years for the building to be completed. In mean time, Government of Pakistan acquired the "services of Mr LC Key, Deputy Librarian of the National Library of Australia, to undertake a survey of library services in the country and prepare a plan for future development"⁽³⁹⁾ under the Colombo Plan. Mr. LC Key arrived in Karachi in 1955 to act as Library Consultant attached to the Ministry of Education. He stayed for a period of about 12 months. In August, 1957 Mr. Key submitted a plan for library development, designed as a four-year project and involving about 36 libraries.⁽⁴⁰⁾ "The report was completed in 1956 and was circulated for comments to provincial governments, universities and librarians, but was never made public officially. That document has remained shelved since then and has almost been forgotten".⁽⁴¹⁾ According to Brown⁽⁴²⁾ "in 1958, after completion of the building, central public library was opened to the public. In 1962, this building was turned over to the University of Dhaka. The Public Library, however, remained in the building. This has caused some administrative problems, as well as some confusion as far as the general public is concerned. ... There is some danger of this library losing its identity as a public library due to its present location on University property".

37. Khan, AM Motahar Ali. *Public libraries in East Pakistan*. **Eastern Librarian**, 1969; 4(1): 52.

38. *Ibid*.

39. Anwar, A. Momtaz. *op.cit*. p.14.

40. Khan, AM Motahar Ali. The present position of public libraries in Pakistan. *In: The need fore public library development: being the proceedings of the seminar, organized by the East Pakistan Library Association and The British Council/ ed. by M. Siddiq Khan, and TJ Maughan. Dhaka: Library Association of East Pakistan, 1966. p.89.*

41. Anwar, A. Momtaz. *op.cit*.

42. Brown, Emerson, ... etal. *Book production, importation and distribution in Pakistan*. New York: New York State University for USAID, 1966. p.70.

L C Key the first and only library consultant to the Government of Pakistan, observed: "... the East Pakistan Government has recently taken a commendable step in setting up under the Social Uplift Scheme of the East Pakistan Central Public Library with progressive statement of functions".⁽⁴³⁾ Meanwhile, the language movement of 1952 in the month of February put a new dimension in the cultural consciousness of the people. As a result, and in the line with the recommendations of the Key Reports, the Central Public Library was organised. It, however, started functioning from 1958 for public "with an initial collection of 20,000 volumes, including a gift of 4,000 volumes received from the UK".⁽⁴⁴⁾ Two decades later the Bangladesh Education Commission had nothing to report about it except to state that "a very feeble effort at establishment of public libraries in this part was made during the fifties".⁽⁴⁵⁾ According to a Directory published by the Pakistan Bibliographical Working Group,⁽⁴⁶⁾ there were only twelve public libraries in 1957 in the then East Pakistan. However, by the 1966 the number of public libraries rose to 108.⁽⁴⁷⁾ During the next five years, the number remained more or less the same, for in 1970 it was 112.⁽⁴⁸⁾ The total number of public libraries since then may have decreased because of the ravages brought by the liberation war of 1971. There are no official statistics available for 1977 or 1978, but assume that there were about one hundred public libraries in Bangladesh.⁽⁴⁹⁾ According to the official records

43. Key, L.C. Report and proposals on the establishment and improvement of the libraries and library services in Pakistan. Karachi: Ministry of Education, 1956. p.5. (*Unpublished doc.*)

44. Alam, Shah M. Nazmul. *op.cit.* p.23.

45. Bangladesh Shiksha Commission Report. Dacca: Ministry of Education, 1974. p.238.

46. Pakistan Bibliographical Working Group. A guide to Pakistan libraries, learned and scientific societies and educational institutions, including museums and art galleries. Karachi: Pakistan Bibliographical Working Group, 1957. p.2-3.

47. Brown, Emerson, et al. Book production, importation and distribution in Pakistan. New York: New York State University for USAID, 1966. p.70.

48. Khan, AM Motahar Ali. *Public library situation in East Pakistan. Pakistan Librarianship*, 1972. p.300-311.

49. Haq, AM Abdul. Bangladesh. In: Miles M. Jackson, ed. *Contemporary development in librarianship: an international handbook*. London: Library Association, 1981. p.173.

of the Directorate of Public Instruction the total number of aided non-government public libraries in Bangladesh in 1982 was 145.⁽⁵⁰⁾

In 1982, the Bangladesh *Parishad*, successor of the erstwhile Pakistan Council and the Bureau of National Reconstruction (BNR), was dissolved⁽⁵¹⁾ and at the behest of the Administrative Recognition Committee, the present Department of Public Libraries was created in 1983.⁽⁵²⁾ Presently, under the Department, there are 66 public libraries with the Central Public Library as its headquarters. This public library network spans all the carefully designed programme to create the district headquarters, except 2 (Sariatpur and Narsingdi). A development project for the establishment of libraries in all these places is under implementation.⁽⁵³⁾ Of the 66 district government public libraries, only Rangpur, Sherpur, Gazipur, and Mymensingh are housed in their own accommodation, 44 in rented private buildings, and the rest accept Central Public Library at Dhaka are accommodated in the buildings allocated by the local district administration.⁽⁵⁴⁾ Now under this Department, there are one central public library (at Dhaka), four divisional public libraries (Rajshahi, Chittagong, Khulna, and Barisal) and 61 district and sub-centre public libraries through out the country. The Central Public library was intended to be the nucleus of the public library system in the then Province. The library was to become a base for activities for:⁽⁵⁵⁾ 1."development of all libraries and other government libraries throughout the province; 2. development of non-government public libraries through grants of aids; and 3. reorganization of District public libraries, Subdivisional public libraries, and Thana public libraries".

50. Bangladesh Central Public Library. Official records.

51. Bangladesh. Ministry of Education and Religion. Culture and Sports Division. *Notification N. Sha: 10/U-47/82/207(160)-Sangskri. Dated 30/8/82.*

52. Alam, Shah M. Nazmul. *op.cit.* p.24.

53. *Ibid.* p.24-5. 54. Bangladesh Central Public Library. *Official doc.*, 1996.

55. Khan, AM Motahar Ali. *op.cit.* p.52-3.

The Department of Public Libraries was created to: 1. provide reading facilities for all classes of readers; 2. act primarily as a reference library with general reading rooms, special reading room for ladies, periodicals room, research room, and manuscript room; 3. build up and maintain a comprehensive book collection as varied as possible with special emphasis on text and reference books; 4. build up and maintain adequate stock of books of juvenile interest with arrangement for circulation through juvenile libraries situated in different residential areas of the city; 5. function as a cultural centre with a foster intellectual interest and reading habits among the general public; 6. shoulder responsibilities of reorganisation and development of public libraries in the country; 7. provide advisory service and reference services to the public in general; 8. provide research and reference service to scholars and to government departments; and 9. organise country-wide literary competition with a view to find new talents in the library field.⁽⁵⁶⁾ The total manpower is 398.⁽⁵⁷⁾ "The Central Public Library in Dhaka has a total building space of 62,300 sq.ft., and the divisional public libraries at Chittagong, Khulna, and Rajshahi have, respectively, building space of 46,000 sq.ft., 22,500 sq.ft., and 16,720 sq.ft."⁽⁵⁸⁾ The Central Public Library at Shahbagh, Dhaka has a total collection of 156,376 books.

The divisional library at Khulna, established in 1965, now has a total collection of 69,106 books. The divisional public library at Chittagong, opened in an expanded form in July 1989, has a collection of 73,671 books, whereas the divisional public library at Rajshahi, functioning since June 1983, has a total collection of 32,690 books. The total collection of books in this department is about 6,93,668.⁽⁵⁹⁾ The Department of Public Libraries offers only the reading facilities for the users. Equipment used in offering services and facilities include: plain paper copier, duplicating machine, typewriter, 16 mm sound film projector, film projector, television,

56. Anwar, A. Momtaz. *op.cit.* p.18-21.

57. *Ibid.*

58. Alam, Shah M. Nazmul. *op.cit.* p.25.

59. Situational Report on National S&T Informational Infrastructures and services in Bangladesh: second draft. Dhaka: BANSDOC, 1996. p26.

V.C.R, radiogram, and tape recorder.⁽⁶⁰⁾ In this connection, to have a complete scene of the public libraries in Bangladesh are shown in the *Table: 5*.

Table-5: Public libraries in Bangladesh

<i>DIVISION WISE</i>	<i>GOVT PUBLIC LIBRARY</i>	<i>NON-GOVT DISTRICT PUBLIC LIBRARY</i>	<i>NON-GOVT THANA PUBLIC LIBRARY</i>	<i>OTHER PUBLIC LIBRARY</i>
Dhaka	18	14	85	25
Chittagong	11	9	47	18
Khulana	10	10	42	20
Rajshahi	17	15	81	22
Barishal	6	5	30	35
Sylhet	4	4	31	12
Total	66	57	316	132

During the Third Five Year Plan (1985-90) the major programmes in the field of library activities in the country were development of Chittagong Divisional Public Library, development of 17 district public libraries, establishment of 7 new district public libraries. Training programmes for the librarians were also included.⁽⁶¹⁾ Actually the Third Five Year Plan intended to materialise the incomplete task of Second Five Year Plan (1980-1985).

But unfortunately no significant development was visible through the whole period of plan. Within this plan period the cultural affairs division formed its own Ministry as Ministry of Cultural Affairs with the Government and non-Government public libraries, National Library and Archives.

During the Fourth Five Year Plan:(1990-1995) period, no library development projects were included except providing grants to the non-government public libraries through National Book Centre of Bangladesh and to arrange a training programmes of library

60. Souvenir. National Seminar on Preparing the libraries and Librarians of Bangladesh for the 21st Century: 26-28 December, 1993. Dhaka: Library Association of Bangladesh, 1993. p.30.

61. Planning Commission. Third Five Year Plan: 1985-90. Dhaka: Planning Commission, 1985. p.

personnel from Government and Non-Government public libraries of the country. During the Fifth Five Year Plan 1995-2000 period the following programmes were undertaken: a. Development of public libraries Second phase, under which Government public libraries will be established at remaining two districts (Sheriatpur and Narsingdi) and accommodation and other physical facilities will be created for eight other district Government public libraries. b. Further development of Chittagong Muslim Institute and Chittagong Public Library. The Plan includes introduction of computers and other facilities in Chittagong divisional library also.

A twenty years perspective plan was also submitted to the Government in this period which includes the 1. development of country-wide public library network up to root levels; 2. enactment of Library Legislation (the country does not have any library Legislation as yet) ; and 3. modernization of public library services.

Meanwhile a National Book Policy was framed in 1993 under which a number of recommendations as: a. Enactment of Public Library Legislation; b. Expansion of Public Library network up to Union levels; c. Employment of professionals in the library services; and d. Up-grading the service standard of college and university libraries, etc. were included. A draft proposal of Library Legislation was submitted by the Department of Public Libraries to the Government in 1995. The Proposal is yet under consideration. Regarding the aided Non-Government public libraries in the country it is true that they were the fore-runner of public service in this country. They have immense contribution to the spread of mass education and knowledge and to the movement for national awareness. But the recent deteriorating trend in most non-government public libraries of the country shrouds in eclipse the brilliant past of the library movement in Bangladesh. It is well known that most non-government public libraries were started out of public

contribution and one time big voluntary donation in cash or kind from the philanthropists or Zamindars of those days. At present there is no zamindari system at all in the country. Now Government took the place of Zamindars. The vast majority of the non-government public libraries falls in this category. They do not have any source of permanent funds. The membership fees collected and the government grants taken together are so nominal and meagre that this can not support even a part of the salary of the library staff, not to speak of the book budget or maintenance of the building. As a result most of the them are rather sick and in a moribund status. The inspection report of the OSD Library, Public Library Survey Report By JS Parker, and sample survey by the Department of Public Libraries in 1988 bear testimony to this statement.⁽⁶²⁾

There are, of course, some non-government public libraries which are supported by rare personalities who, by their personal endeavour, created some trusts or funds or some profit earning or revenue earning permanent assets meeting the establishment and other costs, including book purchase and management. They are very few in number and among these *Jessore Institute of Public Library* is noteworthy. The book bank and mobile book loan service of the Jessore Public Library deserves special mention.

COMMUNITY AND RURAL LIBRARIES

Some Non-Governmental Organizations (NGOs) have been organising libraries and resource centres at the community and rural levels. For example, Community Development Library (CDL), Bangladesh Rural Advancement Committee (BRAC), *Proshika Manabik Unnayan Kendra*, *Gona Shahajjya Sangstha* (GSS), *Asha, Gano Shahthya Kendra*, etc. are noteworthy. They have set-up their libraries with their centres in the rural areas for providing information. The rural centres disseminate information to the rural people to develop their skills. The Government and other donor

62. Suvenir. *op.cit.*

agencies in home and abroad have been provide grants and book supports to some of them for continuing the service for the rural people.

With the support of UNESCO, BANSADOC and Library Association of Bangladesh organized village libraries and information centres in three villages in Dhamrai Thana around 40 km from the Capital City. CDL runs 40 rural Information Centres in the remote areas to serve the rural people.⁽⁶³⁾

ACADEMIC LIBRARIES

Academic libraries are those, which are attached to any academic institution. The basic function of the academic library is to aid the institution in carrying out its own objectives. UNESCO has recognised that academic libraries play an indispensable role in the dissemination of information and knowledge, and has taken active steps to promote their establishment and improvement through out the world, by support of pioneer school, college and university library in the country and of maximum cooperation between existing institutions through out the world.⁽⁶⁴⁾ In Bangladesh academic library includes the library of school, madrasa, college, university and similar institutions.

SCHOOL LIBRARY

Schools in Bangladesh are composed of a. Primary, b. Junior Secondary, and c. Secondary schools. There are 66,168 (all types) primary schools in the country. The average number of students in each primary school is 229 students. The total number of teachers in primary schools in Bangladesh is 2,64672.⁽⁶⁵⁾ It is a fact that libraries in the primary schools are non-existent. Even no attempt has been made to establish a library in a primary school in any development scheme.

63. Situational Report...p.63.

64. Chandler, George. Libraries in the modern world. Oxford: Pergamon Press, 1965. p.45.

65. BBS. Statistical yearbook of Bangladesh: 1995. Dhaka: BBS, 1996. p.487.

In the junior secondary and secondary, at present there are about 317 Government, 9145 Non-Government secondary schools and about 2288 Non-Government junior High schools in the country.⁽⁶⁶⁾ Though library in a school plays a vital role to bring about significant development and can play a very important role to influence and mould the habits and character of a child or youth even, but schools in the country unfortunately almost do not in practice have any worth mentioning library. According to the Education Commission Report, there are no libraries in the primary schools. Nor is there any possibility of their being set-up in the near future. To speak the truth, only few schools, say *Zila Schools* established during the age of preparation, have books and some forms of libraries in them. But most books are out dated and obsolete and have become unworthy. Some attempts were made later on to improve the situation and to develop libraries in the multilateral and bilateral schools but met with little success.⁽⁶⁷⁾

According to the opinions of the experts, the libraries of secondary schools are for various reasons not functioning well. A few steps were taken by the government for improvement of the Secondary Schools in Bangladesh. A full time librarian with a qualification of Higher Secondary Certificate and having a short time training course, was appointed for 22 pilot schools. Necessary books were given to these schools through the Education Extension Centre. But other secondary school libraries suffer from lack of suitable accommodations, and insufficient number of books. They have negligible budget allotment for development of their libraries. They have no full time librarian with requisite qualifications. Those secondary schools which were brought under development programme, receive some grants for purchase of books and sometimes some NGO's donated books to few selected schools. A few secondary school (both Government and Non-Government) teachers also under

66. BANBEIS. Official Doc. 1996.65. Bangladesh *Shiksha* Commission Report: 1974. Dacca: Ministry of Education, 1974. p.235.

66. Chowdhury, Safoqur Rahman. *School libraries in Bangladesh*. Eastern Librarian.

67. Ahmad, Sultan Uddin. 1994. p.58.

went a short time training course at the Library Association of Bangladesh and Education Extension Centre. But due to small amount of grants and books their training has not been utilised.⁽⁶⁸⁾ Libraries in the high schools are generally described as either non-existing or inoperative.⁽⁶⁹⁾ The Education Commission observes:

In a majority of the schools, the library is scattered, most of the books being in the headmaster's room and the teacher's sitting room and the rest in knocks and corners-all locked in book cases. New books are mixed up with heaps of worm-eaten, and out of use books, getting spoiled in no time for want of space, which cannot be segregated. To write off obsolete books is not free from complications arising out of rules and procedures.... In such unfavourable circumstances the question simply does not arise of any organization or adoption of modern technique. The uncouth appearance of the scattered school library fails to arouse any interest in teachers and pupils.⁽⁷⁰⁾

However, Commission put much stress upon the importance and necessity of library in education in general and secondary education in particular. The report of the Commission says: "library is the heart of the school".⁽⁷¹⁾

MADRASHA LIBRARY

In Bangladesh, there are another system of education besides the general education system known as Madrasa education which imparts religious instruction to the Muslim students. There are 6172 madrashas including Dhakil, Alim, Fazil, and Kamil level in the country.⁽⁷²⁾ At present most madrashas have no library except a few holy books and other religious collections. However, the Madrashas are gradually being integrated with the general education system and a good number of such institutions now offer science course of secondary and higher secondary level in addition to their normal courses. But regarding the library, the condition is almost same with the secondary schools.

68. Huq, AM Abdul. Bangladesh. In: Miles M. Jackson. Contemporary development in Librarianship: an international handbook. London: Library Association, 1981. p.175.

69. Bangladesh Shiksha Commission Report: 1974. *op.cit.* p. 234.

70. *Ibid.*

71. BANBEIS. *op.cit.* p. c-j.

72. BBS. Statistical yearbook of Bangladesh: 1995. *op.cit.*

COLLEGE LIBRARY

The history of establishment of colleges in Bangladesh goes back to 1841 when Dhaka College was established and up to 1943 about 32 famous colleges were established in the country. These colleges had brilliant role to develop the education in this part of the then undivided Bengal.⁽⁷³⁾ According to a survey conducted by Bangladesh Bureau of Educational Information and Statistics (BANBEIS) in 1995 there are 230 Government and 915 Non-Government colleges in Bangladesh which consists of Intermediate, Degree, Honours, and University colleges. The condition of library in almost all of these colleges is gloomy. In addition, there are at present 131 professional colleges,⁽⁷⁴⁾ including 17 medical college, 02 dental college, 01 nursing college, 43 nursing institutes, 37 homeopathic college, 32 law college, 21 music college, 10 TT college and 02 physical teachers education institutes and 14 other colleges for multi-disciplinary education. Every institution has a library of its own either small or big. All colleges must have a library, but the collections of most of the colleges are not systematically organized. Only about 25% of government college libraries are staffed by professionally qualified personnel, while most non-government colleges have almost none. One hundred ninety three (193) professional and vocational training institutions include 04 technology, 18 polytechnic, 51 vocational, 18 commercial and 01 each in the fields of graphic, ceramic, leather and textile technology, 54 primary teachers training college and 43 health assistant institutes. All of them have libraries.⁽⁷⁵⁾

UNIVERSITY LIBRARY

The history of university libraries in Bangladesh goes back with the establishment of Dhaka University in 1921.⁽⁷⁶⁾ However, the country today has 12 Government/ autonomous*

73. Khan, M. Siddiq. *Libraries in Pakistan*. *Eastern Librarian*, March 1967; 1(3):12.

74. BANBEIS. *op.cit.*

75. BBS. *op.cit.*

76. Khan, M. Siddiq. *op.cit.*

universities and their libraries are functioning in a traditional way almost from the establishment of the universities by the Government (see *Table: 6*). The country has also about 22 Non-Government Private universities already approved or being processed by the University Grants Commission or by the Ministry of Education, some of them have their mentionable libraries with a very rich collections as shown in the *Table: 7*. The libraries in other private universities are yet to grow properly.

Table- 6 : Growth of the govt and autonomous universities and their libraries with collections

#	Name of the University	Year of Establishment of		Growth of collections					
		University	Library	1991	1992	1993	1994	1995	1996
1	University of Dhaka*	1921	1921	590696	608956	610848	612320	619302	623528
2	Rajshahi University*	1953	1953	252896	258682	261444	263709	239410	271528
3	Bangladesh Agricultural University*	1961	1961	136640	142684	145234	159255	161687	164884
4	Bangladesh University of Engineering and Technology*	1961	1961	109872	110793	116957	118150	119969	124652
5	Chittagong University*	1966	1966	148268	151987	156621	162712	162080	167218
6	Jahangirnagar University*	1970	1970	62693	65864	69542	71411	67979	69522
7	Islamic University, Kushtia*	1986	1986	27532	29982	32518	38894	39692	41448
8	Bangladesh Open University	1991	1993	nil	nil	nil	nil	3420	4674
9	Khulna University*	1991	1991	nil	1864	5036	8702	12115	13221
10	Shahjalal University of Science and Technology*	1991	1992	nil	2956	5439	6427	7141	8546
11	National University, Gazipur	1992	1992	nil	nil	nil	nil	2200	2954
12	Jagannath university (Proposed)	1995	1995	nil	nil	nil	nil	34590	35460

As compared with public and other type of academic libraries the condition of ^{some} university libraries in Bangladesh is satisfactory regarding their variety of resources, manpower and services. But this does not mean that they are meeting the required standards or participating in the universities educational and research programmes satisfactorily. Among the available resources, due to the deficiency of high calibre and skilled staff, lack of proper modernization of the facilities and lack of union catalogue, the university libraries in Bangladesh failed to attract the potential library users into a habitual one. A brief discussion has been made in the following pages on the major university libraries of Bangladesh, which used new technologies to some extent.

DHAKA UNIVERSITY LIBRARY

The Dhaka University Library came into being with the establishment of the University of Dhaka in 1921. The aim of the library is the expansion of education and research in the field of arts, science, social science, commerce, and law. The library is situated in three buildings, central library building (main library), the administrative building, and science library building. The total space of the entire library building is 1,40,750 sq.ft. The space of the central library building and the administrative building is 100.750 sq.ft., whereas the space of the science library is 40.000 sq.ft., It has a total staff of 224 personnel. The Dhaka University Library began functioning in 1921 with an inherited collections of 18,000 books from the libraries of the old Dacca College.⁽⁷⁷⁾ Its total number of books and periodicals in 1991-92 was 5,41, 789, in 1995 the collection was increased to 6,10,848,⁽⁷⁸⁾ its collection in December 1996 was 6,23,528⁽⁷⁹⁾ and the number of manuscripts at present are 30,000.⁽⁸⁰⁾ The total budget for the year 1995-1996 was Tk. 1,84,95,751.00.⁽⁸¹⁾ Only the bonafide students, teachers, researchers, and the staff of the university can be members of the library. The library is kept open from 8 a.m. to 9 p.m. from Saturday through Wednesday and from 8 am to 5 p.m. on Thursdays.

The library renders the following services: reader's service, reference service, ^{and} reprographic service. It has the following publications 1. A catalogue of research resources at the Dacca University Library No.1,1982; 2. An alphabetical index of Bengali manuscripts in the Dhaka University Library, Parts 1 and 2; 3. Index to articles of Bengal: past and present V. 1-85. 1986.

77. Khan, M. Siddiq. Libraries in Pakistan. *op.cit.* p.12.

78. Bangladesh University Grants Commission Annual Report 1995. Dhaka: UGC, 1996. p.24.

79. Official document of the Dhaka University Library, 1996.

80. Souvenir. *op.cit.* p.30.

81. Official document of the Dhaka University Library, 1996.

The authority of the library has taken initiative to computerise the library activities. The library has, meanwhile introduced photocopying services for the students, Fax and computer with CD-ROM facilities for the users. The library has already begun to create its own databases of the holdings. The CDS/ISIS has already been installed for serials control and indexing to articles. There is also a microfilming unit with a reader in the library which has been inherited from the Atomic Energy Commission since late 1960s.

BANGLADESH UNIVERSITY OF ENGINEERING & TECHNOLOGY LIBRARY

Ahsanullah School of Engineering established in 1876, was upgraded to an Engineering College in 1947. This college was raised to a university in 1962 under the title "East Pakistan University of Engineering & Technology" which was after the Independence of Bangladesh in 1971, renamed as the Bangladesh University of Engineering & Technology (BUET).

Facilities available and services offered: The central library is situated in a four-storey building of its own, having approximately 20,000 sq.ft. of floor space. It has a total collection of 1,246,952⁽⁸²⁾ volumes of which 9,987 are bound periodicals.⁽⁸³⁾ The beneficiaries served by the library are mainly students and teachers, professional engineers, research fellows, officers and other staff of the university including visiting scholars. There are a total of 41 staff members in the library, including 8 professional having Master's degree in library and information science.

Two microcomputers are used for word-processing and data processing work of the library. For office automation, at present, WS. 4 and WP 5.1 are mostly used in most

82. Official documents.

83. UGC. *op.cit.*

84. Hai, Kazi Md. Abdul. Use application of information technology in libraries: microcomputers and dBase 3+. In: National Seminar on "Preparing the libraries and Librarians of Bangladesh for 21st Century: 26-28 December, 1993; Souvenir. Dhaka: Library Association of Bangladesh, 1993. p.

of the library office work. For data processing in microcomputer, application programme is greatly used in the library. The dBase 3+ has been chosen to process data in the library.⁽⁸⁴⁾

Books are catalogued in computers and catalogue cards of various types, accession bulletins, order lists, etc., are prepared by computers. BUET Library provides photocopying, and microfilming facilities to its students, teachers, and staff. The library has already fax and E.mail services and begun to create their own databases of the holdings as well. Services of the library include: document delivery current awareness, preparation of directories and bibliographies of various types, reference user orientation, literature searches, research reports for readers, advising and problem solving of individual enquiries, reproduction/photocopying services, interlibrary loans, and lending. Besides, the library has rental library facilities for the students that is unique of its type in the country. It provides all textbooks of foreign origin to the students at a charge of 10% of the original price for an academic year/term.

NORTH SOUTH UNIVERSITY

North South University (NSU) holds the distinction of being first degree-awarding private university in Bangladesh which received the formal approval of the Government of People's Republic of Bangladesh on November 5, 1992. Indeed, the Government approved the charter of NSU in November 1992 making it the first Government approved degree awarding private university in Bangladesh. NSU Library is located on the 3rd and 4th floor of the third building of the university, having 6000 sqft of floor space. The library has a collection of 9588 and 80 titles of subscribed journals. The library is well organised and equipped with different new technologies to make the services effective. However, planning for the physical integration of various sections has been achieved. This is due to the whole NSU Library being connected to the migration of the library automation system from manual to the CDS/ISIS, which took place in stages from January 1996. There are at

4 computers in the library for processing and disseminate information. The system is connected with LAN, within a largest and widest area in Bangladesh. The library possesses reproduction machines, CD-ROM drives, audio-visual facilities for teaching and learning as well and E.mail access is readily available (E.mail: asattar@nsu.agni.com and library@ nsu.agni.com). An online internet is now available to all users in the library. NSU library will also be entered into the system while the entire collection will be possible to migrate to the CDS/ISIS with Windows version by the January 1997.

Table-7 : Growth of the private universities and their libraries with collections⁽⁸⁵⁾

#	Name of the Universities	Year of Establishment of		Growth of collections					
		University	Library	1991	1992	1993	1994	1995	1996
1	North South University	1992	1993	nil	nil	694	3198	5611	9588
2	Central Women's University	1992	1992	nil	nil	2312	5233	6900	7156
3	Independent University, Bangladesh	1992	1993	nil	nil	nil	1976	2270	4260
4	Darul Ihsan University	1993	1993	nil	nil	1658	8976	10000	11236
5	University of Science and Technology, Chittagong	1992	1992	nil	nil	nil	1238	2208	2862
6	International University of Business, Agriculture and Technology	1993	1993	nil	nil	nil	1296	2552	4264
7	AMA International University	1995	1995	nil	nil	nil	nil	642	984
8	Islamic University, Chittagong	1995	1995	nil	nil	nil	nil	nil	432
9	Samantha University (in process)	1995	No Library	nil	nil	nil	nil	nil	nil
10	University of Asia Pacific	1995	1996	nil	nil	nil	nil	nil	696
11	University of Comilla	1996	1996	nil	nil	nil	nil	nil	210
12	Dhaka International University	1996	1996	nil	nil	nil	nil	nil	280
13	Asian University of Bangladesh	1996	1996	nil	nil	nil	nil	nil	328
14	East West University	1996	1996	nil	nil	nil	nil	nil	326
15	Gono Bishbabiddyalay, Savar	1996	1996	nil	nil	nil	nil	nil	1480
16	North Point University	1996	1996	nil	nil	nil	nil	nil	190
17	People's University of Bangladesh	1996	1996	nil	nil	nil	nil	nil	280
18	Tagore Peace University, Kushtia	1996	No library	nil	nil	nil	nil	nil	nil
19	Queens University	1996	1996	nil	nil	nil	nil	nil	350
20	Ahsanullah University of Science and Technology	1996	1996	nil	nil	nil	nil	nil	nil
21	Bangladesh University of Science and Technology	1996	No library	nil	nil	nil	nil	nil	nil
22	University of Cosmic Science and Language, Chittagong	1996	No library	nil	nil	nil	nil	nil	nil

85. UGC. Official doc. 1996.

Over and above the North South University government also granted recognition to more 21 institute as private universities to award under-graduate and post-graduate degrees in various disciplines. The *Table-7* will clearly illustrate the growth of private universities and their libraries with collections.

SPECIAL LIBRARY

"Since education, study and research, be its technical or other wise, cannot go on without information, a small collection of literature begun to grow slowly but steadily in various types of organizations and institutions in Bangladesh. Some of these mould hills literature ultimately culminated in big mountains that the authorities of most of the organizations and institutions felt the necessity of some control over the literature, first by providing space for their storage, and secondly, appointment of some one (not necessarily a professional personnel) for their care and retrieval. This led to the gradual growth and development of libraries in those organizations or institutions- all of these species together constitute the gems known as special libraries in East Pakistan,⁽⁸⁶⁾ the present Bangladesh.

However, after the independence of Bangladesh in 1971 intensive patriotic feelings among the millions of free people generated new inspirations for prosperity. To meet this asperity and challenge, emphasis was placed on the development and proper utilization of resources, human skill and intellect. Hundreds of agencies and projects, and a numbers of commissions (e.g. education, labour, industrial, scientific, information (journalistic), social and cultural, land reforms, etc.) were set up by Government for study, research and analysis of all the problems hindering national existing resources.⁽⁸⁷⁾

86. Siddique, Abu Bakr. *Special libraries in East Pakistan*. *Eastern Librarian*, Sept 1969; 4(1):74.

87. *Ibid.* p.73.

Since the required study and research for each of the organizations cannot be pursued without library attached to them, so the nucleus collection of those organizational libraries grew and as such growing in number in Bangladesh.⁽⁸⁸⁾ Thus the state of special libraries in Bangladesh is encouraging. Special libraries both Government and Non-Government, play an important role in Bangladesh for national development and to identify methods to progress in all fields of human activities with and are an integral part of the library system of the country. Most are associated with scientific organizations, research institutions and Government departments and are staffed by professional librarians.⁽⁸⁹⁾

Special libraries are now part of the 36 Government ministries with 50 divisions, 164 attached departments/directories with sub-ordinate offices, 134 autonomous bodies under the ministries/divisions, 72 foreign missions in Bangladesh⁽⁹⁰⁾ and 162 private organizations, news agencies, societies, learned bodies as well as 62 non-governmental organizations and voluntary organizations. Another estimation shows that there were 590 special or research libraries in Bangladesh in 1982.⁽⁹¹⁾ A recent survey of this researcher shows that the total number of the special libraries in 1996 stood at 680. Social, economic, scientific and technological progress, the development of successful research and services depends on the acceleration of special library system. But it is a matter of fact that among the existing special libraries in the country a few agricultural, social science, law, and medical libraries are quite large, better organised and well equipped with new technologies.⁽⁹²⁾

88. Ahmad, Nasiuddin. Personnel requirements in the libraries of Bangladesh. *Intl Inf Libr Rev*, 1994;26:320.

89. Khan, M. Siddiq. *Libraries in Pakistan*. *Eastern Librarian*, March 1967; 1(3):12.

90. BBS. Statistical yearbook of Bangladesh: 1994. Dhaka: BBS, 1995. p.9-19.

91. BANBEIS. Unpublished documents. 1996.

92. Foote, Jody Bales, 1996.

Along with special libraries in Bangladesh, the following category of libraries plays a vital role towards the national development:

***BANGLADESH INSTITUTE OF DEVELOPMENT STUDIES
LIBRARY AND DOCUMENTATION CENTRE***

The Bangladesh Institute of Development Studies (BIDS), previously known as the Pakistan Institute of Development Economics, began its life in Karachi in June 1957. In December 1970, the Institute with all its staff, library, and equipment was shifted to Dhaka. Up to 1973 it retained the name of Bangladesh Institute of Development Economics (BIDE). In 1974 the Institute was given a free Parliament Charter by the Bangladesh Institute of Development Studies Act XXIX, 1974.⁽⁹³⁾ Since then, it is known as the BIDS. BIDS, a multi-disciplinary research organisation, undertakes basic research on development problems of Bangladesh, and functions as an agency for promoting study, research and dissemination of knowledge in the fields of economics, demography, and other branches of social sciences, including those relating to planning for national development and social welfare. It also provides training in socio-economic analysis and research methodology for its professional staff and for members of other organisations from home and abroad, concerned with development problems. It is governed by a Board of Trustees.

To provide support to the researchers of the BIDS, and policy-makers, planners, administrators, and researchers of the government and non-government organisations, members of foreign diplomatic missions, officials of UN agencies, university teachers and students, etc. the BIDS has gradually built up one of the biggest and best libraries in the country in the field of social sciences.

93. Suvenir. *op.cit.*

The library and Documentation Centre (LDC) has a total collection of about 1,38,000 and is manned by a staff of 17 personnel. The collection covers books and documents largely in the areas of economics, agriculture, demography, rural development, industry human resources, and other branches of social sciences, relating to planning for national development and social welfare. The library receives over 800 current periodicals through subscription, exchange, or gift from various national regional and international institutions. It has about 20,000 back volumes of periodicals. The microfiche collection (25,000) consists of the Australian Government publications, Australian national bibliography, and the Indian population census reports. The library has more than 5,000 reprints in its collection. It maintains exchange relationships with over 350 organisations all over the world to acquire books, documents and periodicals. The library has been designated as the depository library for the World Bank and United Nations University publications. A large number of various types of World Bank and United Nations University publications are available for consultation. The library materials are preserved in air-conditioned environment. The reading room is also air-conditioned.

The library offers services, such as reference: current awareness; SDI (selective dissemination of information); photocopy supply on payment, microfiche reading, referral, advisory as and when asked for by its users, inter-library loans, bibliography, indexing of special materials, preparation of directories, and ^{announcement of} recent arrivals. The library has photocopier, microfiche reader personal computer electronic scanner, spiral binding machine, electric typewriter, monograph duplication (manual) and cyclostyle (mimeographing) machines, overhead and slide projectors. The library has been developing databases for the following types of publications, published by the BIDS, DEVINSA. It issues the following publications: * Current Awareness Service Bulletin (journal articles) *Library Bulletin (books) *Library Bulletin (documents) *Bibliographies (occasional) * World Bank publications bulletin.

The borrowing facility is limited to the BIDS staff and the associate members only. All students and teachers are allowed to borrow materials from the library while they are in service at the BIDS. However, materials must be returned prior to their departure. The reading facility is open to all. The library is kept open from 8.00 a.m. to 5.30 p.m. on all days, except the government holidays. The library is financed out of the allocation of funds from the annual budget of the BIDS. It also receives donations created a Library Endowment Fund, and the income generated out of this fund is used for the purchase of library materials, such as books, journals, etc., as well as for the development of the Library and Documentation Centre (LDC). The LDC has been designated as a national focal point of the Development Information Network for South Asia (DEVINSA) and Development Science Information System (DEVSIS)- oriented regional information network on social science under the aegis of the Committee on Studies for Cooperation in Development in South Asia (CSDC), funded by the International Development Research Centre (IDRC) Canada.

SAARC AGRICULTURAL INFORMATION CENTRE

The SAARC Agricultural Information Centre (SAIC), established in 1988 in recognition of the pressing need for a regional information system for effective promotion of cooperation and coordination in production and exchange of information in agriculture and allied sciences among the Member States, is governed by a Governing Board, composed of one member from each of the SAARC countries. The Governing Board formulates policies and oversees the function of the Centre. On a day to day basis, the SAIC Director guides the implementation of programmes and activities carried out by seven professionals. The various activities of the SAIC are assigned to four complementary divisions: Publication, Information, Computer, and Library and Reprography Division. Each division is headed by one Deputy Director responsible for the implementation of the activities of the Division. The

professional staff include four Deputy Directors, one Information Specialist, one Computer Programmer, and one Reprographic Specialist. The Director and professional staff are supported by 34 general services staff.

The objectives of the SAIC broadly are to: a) establish an agricultural information network with effective linkages with national institutions in the Member States; b) identify and document all pertinent literature published and unpublished in the fields of agriculture sciences, including forestry, fisheries, livestock and allied disciplines; c) serve the agricultural information needs of the Member States, and d) promote new and better techniques, including training for handling and disseminating agricultural information.

SAIC was established to: * Collect information on current literature, ongoing research and development projects, research and development institutions, education and training opportunities and resource persons in various fields of agriculture through the Member States's Focal Points in the network.; * Select, analyse and process regional agricultural documents useful to regional users; * provide access to these documents for users in the region; * produce bibliographies, directories, etc. Of regional importance; * provide selective dissemination of information, copies of documents, microfiches of conventional and non conventional literature generated in the region; * organise and provide training on information sciences to the personnel of the Member States; and * function as the regional centre for South Asia and have access to international information systems, such as AGRIS, CARIS, CABI, etc., and regional agricultural information systems, such as AIBA, FADINAP, NFIS, etc.

During the past three years, the SAIC has been growing satisfactorily. Technical Microprocessing of Non-Conventional Information Materials work in agricultural information science has been initiated, and foundations are being laid for the future

use of information needed for regional planning for prosperity of the SAARC region. Presently with the help of the AIC and BARC, SAIC offers the following services for the local and international users: a) reference services and video media; b) document-delivery service c) computerised database searching d) current awareness service; e) preservation of consultancy reports/organisational publications /bibliographies; and f) literature searching using microfiche reader. SAIC also offers its services and facilities with using plain paper copier, computers, printers (dot matrix and laser), Franking machine for postal franking , microfiche/ microfiche-making machines with readers/printers, and typewriters. SAIC is planning to intensify its activities in pooling information on agriculture of the SAARC countries. The Centre will provide itself with latest data and information among the SAARC countries would help develop fisheries, livestock, crop multiplication programmes, and transfers of technology among them. SAIC also is developing plans to integrate research activities of the agricultural research institutes in the SAARC countries.

The ongoing projects of the SAIC are: ~~the~~ revision of Directory of Agricultural Institutions in SAARC countries, Directory of Agricultural Scientists and Technologists of SAARC countries, the Database on fish diseases in the SAARC region, Database on potato, Directory of Agricultural Periodicals of the SAARC countries, Bibliography on Women in Agriculture in the SAARC countries, Bibliography on Agro-forestry in the SAARC Region, ^{and} Directory of On-going Research Projects in SAARC Member States.

CENTRE ON INTEGRATED RURAL DEVELOPMENT FOR ASIA AND THE PACIFIC LIBRARY

Centre on Integrated Rural Development for Asia and the Pacific (CIRDAP) Library is regional, inter-governmental and autonomous institution. It was established in July 1979 by the countries of Asia and the Pacific Region at the initiative of the Food and

Agriculture Organisation (FAO) of the United Nations with support from other concerned UN bodies and donors. CIRDAP now has 11 member countries: Bangladesh (host state) India, Indonesia, Lao PDR, Malaysia, Nepal Pakistan, the Philippines, Sri Lanka, Thailand, and Vietnam. Operating in member countries through designated Contact Ministries and Link Institutions, the CIRDAP has access to government policy-makers, research and training institutions, and non-governmental organisations. The Centre was established to a) assist national action; b) promote regional cooperation and c) act as a servicing institutions for alleviation of rural poverty through people's participation in development. CIRDAP is thus, concerned with a) agrarian development b) institutional/infrastructural development, c) resource development including human resource and d) employment. The documentation and Information Division, one of the five divisions of the CIRDAP, act as a supporting unit and enables the CIRDAP to act as the development for the Asia Pacific region.

The objectives of the Documentation and Information Division are as follows: a) Assessment of information requirements and facilities available/needed in the context of IRD; b) Generation of relevant databases on IRD; and c) Initiation and promotion of appropriate documentation and information services in order to act as a clearing-house on IRD for CMCs and others in the region.

The library, an unit of Documentation and Information Division, focuses on the collection and processing of source materials and information on rural development and relevant issues, and dissemination of the same. Accordingly, collection of selected published and unpublished materials, gathering of relevant information, creation and maintenance of bibliographic database and dissemination through various channels *are the key functions of the library.* Institutional documents, such as books, journals, brochures, programme literature, reports of various research studies, proceedings of conferences,

seminars and workshops from the countries of the region in general and CMCs in particular form an important part of its total collection.

Besides, the CIRDAP library is a depository centre for the World Bank publications. Presently, the library has about 14,000 documents, and in addition, it subscribes to around 356 journals for purposes of documentation and database generation. It also holds non-book materials, like microfilms and microfiches. The literature received in the library is scanned regularly to compile and circulate Current Awareness Bulletins, Documentation Lists, Accession Lists, etc. A computer has been installed with CDS/ISIS software in the library, and the existing manual set up is being automated. The bibliographic database contains 6,000 records and is increasing day by day. The library offers various services, such as document-delivery reference, current awareness, computer searching, indexing, newspaper clipping, photocopy, reading facilities, etc. Now the library is open for outsiders, and membership facilities are extended for all.

ISLAMIC INSTITUTE OF TECHNOLOGY LIBRARY AND DOCUMENTATION CENTRE

The Library and Documentation Centre of Islamic Institutes of Technology (IIT) formerly *International Centre for Technical and Vocational Training Institute (ICTVTR)* was established in 1986, located at the Board Bazar, Gazipur. With a floor space of about 1,300 sq. Meter, the library has a shelf space for accommodation of 52,000 books. The library has a collection of over 16,000 text and reference books in the various disciplines of mechanical and chemical engineering, electrical and electronics engineering, computer science, Islamic history and culture, educational methodology, and English and Arabic languages. Non-book materials include about 400 items of film strips, cassettes, video films, slides maps, charts, and over 500 items

of various documents on technical and vocational training and research. The library has also embarked on collection of literature on Muslim contributions to science and civilization.

Students can borrow books (maximum 5 books) for a fortnight. The library is fully air-conditioned and is well furnished with modern furniture. Towards modernisation of the library, 3 photocopiers and one microcomputer have already been installed. There is plan to install Tattle tape detector for check post and electronic charging system for issuing a receipt of library materials.

AGRICULTURAL INFORMATION CENTRE

The Agricultural Information Centre (AIC) was established in 1988 in recognition of the pressing need for a national information system for effective promotion of cooperation and coordination in production and exchange of information in agriculture and allied sciences among the member institutes under the National Agricultural Research System (NARS).

The aims and objectives of the AIC broadly are to: a. establish an agricultural information network with effective linkages among NARS institutions; b. identify and document all pertinent literature published and unpublished in the fields of agriculture sciences, including forestry, fisheries, livestock and allied disciplines in databases, microforms and hard copies; c. serve the agricultural information needs of the NARS institutions and individual scientists in their literature searches; d. promote new and better techniques, including training for handling and dissemination agricultural information; and e. train NARS personnel on computerised information processing, technical writing and editing.

AIC was established to: *collect information on current agricultural literature, ongoing research and development projects, research and development institutions,

education and training opportunities and resource persons in various fields of agriculture; *select, analyse and process national regional and international agricultural documents useful to the users; *provide access to these documents for users; *produce bibliographies, directories, etc. Of national importance; *publish and distribute/sell journal/research highlights/monographs/annual reports/booklets/leaflets/folders/brochures/fact-sheets, etc. *provide selective dissemination of information, copies of documents, microfiches of conventional and non-conventional literature; *organise and provide training on information sciences to the personnel of the NARS institutes; *function as the national centre for the NARS and have access to international information systems, such as AGRIS, CARIS, CABL, etc., and regional agricultural information systems, such as SAIC, AIBA, FADINAP, NFIS, etc.

The AIC's programmes and activities are carried out by four sections: Library, Documentation, Publication, and Reprography, Presently, the AIC offers the following services for the users: a) reader's and referral services; b) document-delivery service; c) computerised database searching; d) current awareness.

The equipment has been used to offer services and facilities, plain paper copier, computers, printers (dot matrix and laser) microfiche/microfilm-making machines with readers/printers, and typewriters. AIC is planning to intensify its activities in pooling information on agriculture at a national level by establishing a National Agricultural Information System (NAIS) and to act as the apex body of all information cells under the NARS institutions. The Centre will provide with the latest data and information through computerisation under broad-based programmes. Dissemination of information among the NARS institutes would help develop fisheries, livestock, crop multiplication programmes, and transfers of technology among them and to the grassroots level users.

DIARRHOEAL INFORMATION SERVICES CENTRE

International Centre For Diarrhoeal Disease Research, Bangladesh (ICDDR,B) was established in 1978 as the successor to the cholera Research Laboratory, which had been created in 1960. The Centre is an independent international non-profit organisation for undertaking and promoting research, clinical service, education training, and dissemination of knowledge in diarrhoeal diseases and directly related subjects of nutrition and fertility. The Centre has a staff of over 1,200 personnel, and is governed by a 17 member multinational Board of Trustees. It treats about 100,000 patients a year free of charge. The Centre maintains a Diarrhoeal disease Information Services Centre (DISC) the role of which is to support the research, training, and dissemination of knowledge and activities of the Centre's staff members. This support is provided in a variety of activities, such as information services, library services, publication services, and others.

The aims and objectives of the DISC are to : a) to disseminate information on diarrhoeal disease- related subjects; b) to encourage free flow of information on diarrhoeal disease-related subjects; c) to help promote and encourage appropriate research work on diarrhoeal disease-related subjects, and reduce duplication; and d) to optimise the application of improved practices.

The activities and functions of the DISC are carried out through three functional sections: Information services, Publications services, and Support services. Its various programmes are managed by 11 staff members. The library is fully air-conditioned and has a total space of about 6,000 sq.ft. Approximately, an amount of US \$ 2,000,00.00 is spent annually to carry out its various programmes , activities, and services.

DISC has more than 25,500 volumes of books and bound journals and 12,500 reprints and documents. The library receives 389 current journals - 240 are on subscription and 149 on exchange or complimentary basis- in the areas of medical and health sciences, population, nutrition, and statistics, anthropology etc. The provision of library and information services includes a fairly representative journal collection, a lending book collection, major reference textbooks and other reference sources, an inter-library loan service, departmental book collection, and reference and bibliographic services , including literature searches and a current awareness assistance. The upgraded information retrieval system, with databases (MEDLINE 1966 to present and POPLINE from the beginning) on CD-ROMs, and Current Contents on diskettes, facilitates faster access to published information and literature. More than 400 of the Centre's researchers, physicians, research support personnel, nurses, students, and many international trainees and visitors take advantage of the library's major facilities and services. Besides researchers, teachers, physicians, and students from universities, NGOs, the Institute of Public Health, National Institute of Preventive and Social Medicine and others use the library frequently.

DISC publishes a *Quarterly Journal of Diarrhoeal Diseases Research* (JDDR), an *Annotated Bibliography* (within the journal) (Bibliography on Diarrhoeal diseases), two newsletters (*Glimpse* and *Swasthya Sanglap*), a news bulletin (*ICDDR,B News*) an annual report monographs and occasional scientific and special publications. It mails or distributes annually over 54,000 copies of the Centre's publications to relevant points world-wide. DISC offers, on an average, 75,000 pages of photocopies to its users. The library's borrowing facilities are available to the centre's staff members and those of the Institute of Public health (on limited basis) Library materials can be borrowed by other libraries, provided inter-library loan agreements have been signed. DISC has extended its library facilities and information services by signing inter-library agreements with the National Health Library and

Documentation Centre, Bangladesh Institute of Development Studies, BIRDEM, Aga Khan Community Health Programme, and the US Agency for International Development in 1992.

DISC has been developing four databases using the CDS/ISIS software: journal holdings, book collection, ICDDR,B publications and periodical articles, and completed and ongoing projects of the ICDDR,B. Databases have facilitated faster access to incoming books, monographs, and new periodicals. Continued efforts are made to upgrade the DISC's service delivery and dissemination channels to support its reputation as a specialised information centre of excellence for diarrhoeal disease-related topics. Service is also offered from the weekly Current Contents (Life Sciences) on diskettes. DISC disseminates information on incoming learning resources through its bulletins (two issues a week), and the fortnightly current awareness bulletin (DISC Bulletin) which includes a book acquisition list. The bulletin includes information on incoming issues of journals and periodicals, whereas the DISC Bulletin disseminates information on articles of relevance to the Centre's scientists in particular. The DISC staff members are often required to find answers to informal reference queries.

DISC has the following equipment: personal computers, CD-ROM player, laser-printing facilities, vacuum cleaner, duplicating machines, spiral binding machine, microfiche-making and reading facilities, microfilm readers, electric type-writers, etc.

Future development: DISC will participate in the efforts in making available the databases on Asian health and environment in the electronic formats (CD-ROM). It has plans to have access to international databases through a satellite communication through a ground station to be installed at the ICDDR, B library with the permission of the government. Its information services are being expanded to better serve the needs of various categories of users of library.

NATIONAL LIBRARIES

THE NATIONAL LIBRARY OF BANGLADESH AND ARCHIVES

The UNESCO Conference of 1950 on the improvement of bibliographical services recommended, among other things, that National Bibliographical Information Centre has to be maintained at the national library.⁽⁹⁴⁾ The recommendation of UNESCO Conference has encouraged many government to establish national library. Thus the demands of the new born state of Pakistan has felt to plan and plans were made a shape and executed with establishing the *Liaquat National Library* in the year 1950 at Karachi.⁽⁹⁵⁾ Considering the dire necessity of the national library in the Asia and Pacific region, the UNESCO has again felt and organized a conference of the *Development of National Libraries in the Asian and Pacific Countries* in 1964 in Manila and adopted a resolution for establishing a national library in each member country where it did not exist. In pursuance of the resolutions of UNESCO Regional Seminar in Manila, 3-15 February, 1964⁽⁹⁶⁾ the Government of Pakistan in the late sixties decided to set-up its national library in Islamabad with three subsidiaries in the name of Central Libraries for three important cities of the country- Dhaka, Karachi, and Lahore for the preservation of indigenous publications under the coverage of Copyright Ordinance, 1962.⁽⁹⁷⁾ The Central Library in Dhaka during the Pakistan period received books and newspapers on the basis of Delivery of Books and Newspapers section of Pakistan Copyright Ordinance of 1962 and was called Delivery of Books

94. Huq, AM Abdu. *National library for Bangladesh*. *Eastern Librarian*, 1976; 10(1):39.

95. Khan, M Siddiq. *Libraries in Pakistan*. *Eastern Librarian*, 1967; 1(3):5.

96. Khurshid, Anis. *op.cit.* p.61. *See also*: UNESCO Regional Seminar on the National Libraries in Asian and Pacific Area, Manila, 3-15 February, 1964. *See also*: Information on national libraries in Asia and Pacific Area. Paris: UNESCO, 1963. p.12-54.

97. Development Scheme of the National Library of Bangladesh: second five year plan; 1980-85. Dhaka: Ministry of Sports and Culture, 1979. p.1. *See also*: Hussain, Serwar. National library for Bangladesh. *Herald of Library Science*, Jul-Oct 1987; 26(3-4):206.

and Newspapers Branch, Dhaka.⁽⁹⁸⁾ In fact, Delivery of Books and Newspapers Branch, not a library in the acceptance sense of the term, was started in a rented house⁽⁹⁹⁾ in vicinity of Muhammadpur residential area in Dhaka.

To Trace the growth of National Library of Bangladesh it may be stated that the erstwhile Government of East Pakistan keenly felt to establish a national library. After the emergence of Bangladesh, the Bengali Officers of *Directorate of the Archives and Libraries*, Karachi, on repatriation from Pakistan, were rehabilitated in Book Delivery office, later which was designated as *Directorate of the Archives and Libraries*. The Book Delivery Office formed the nucleus of the proposed national library for Bangladesh.⁽¹⁰⁰⁾

The National Library of Bangladesh stands at the top of the library system of the country, and is responsible mainly for the collection and conservation of the whole of the country's book production and all other printed materials concerning the country, no matter where they are published, for the benefit of the People of the country in general, and for the future generation in particular. After the Independence of Bangladesh, it developed as the national library of the country as per the declaration of the government vide gazette notification no. LB/IL-13/75/385, dated 29 August 1975, LB/IL-13/75/386 dated 29 August 1975 and LB/IL-13/75-546 dated 8 November 1975 of the *People's Republic of Bangladesh*. In 1985, the library was shifted to its own building at Sher-e-bangla Nagar, Dhaka.

The Directorate has, as a whole, a total staff of 74, occupies a total floor space of 13,700 sq.ft. and its budget amounting to Tk.70.08 lacs for the fiscal year 1995-1996. The National Library of Bangladesh now is being staffed by 53 people.

98. Hussain, Serwar. *National library for Bangladesh*. *Herald of Library Science*, Jul-Oct 1987; 26(3-4):206.

99. Ahmed, Zakiuddin. *The national library of Bangladesh: their present status and future ... national information agencies*. *Eastern Librarian*, 1985; 10:38.

100. Development Scheme of the National Library of Bangladesh. *op.cit.*

Facilities available and services offered: The National Library of Bangladesh has the following 8 divisions: a) Bibliography, b) International Book Exchange, c) Book Collection d) Processing, e) Stock Management, f) Research g) Reading Hall Service, and h) Repair and Preservation. It offers: a) bibliographical service, b) research service, c) international loan service, d) International book exchange, e) reader's service. The library also offers: a) free membership for general readers and research workers, and b) free photocopying service of research materials done from its own machine. It has a collection of 200,000 volumes of books, including 3,000 volumes of bound journals, and 1,000 newspapers and subscribed to 300 current journals.⁽¹⁰¹⁾ It maintains loan services with the universities and national and international organisations. The library has a total space provision of 5,550 sq.ft. The library has kept open from 8.30 A.M. to 2:30 P.M. on all working days, and maintained an open-shelving system, but readers must enrol their names as members. The members of above S.S.C level can only use the reference section.

The Asian Development Bank has designated the National Library of Bangladesh as the depository library under the World Bank's depository library programme. The National Library of Bangladesh serves as a clearing-house for the exchange of books and periodicals and is responsible for the coordination of national bibliographical activities.

The National Library of Bangladesh must assume the responsibility for initiating and promoting cooperation between itself and other libraries in the country. It should act as an information centre and assist in the formulation of rules and conditions for all such institutions.

101. Bhatia, Kanta. *A profile of Dhaka libraries*. *The Independent*, 19 April 1995.

THE NATIONAL ARCHIVES OF BANGLADESH

Although the history of national archives in the sub-continent is an old one, the concept of archives and archives keeping is relatively new in Bangladesh. During the pre-British period, the so-called *Mohafezkhna* served as the store-house of administrative records and documents of historic value. During the British rule in the sub-continent, the secretariat administration with all its paraphernalia began to develop. With the increase of secretariat files and records, it was keenly felt necessary to preserve the important ones in a central repository. Hence the Imperial Records Department was created in Calcutta in 1891, which was, subsequently, shifted to Delhi and named as the National Archives of India. During the erstwhile Pakistan period, a small Directorate of Archives and Libraries was established in 1951, but there was no archive's section in the then East Pakistan. The government of Bangladesh set up the National Archives in 1973 under the Directorate of Archives and Libraries. In August 1983, the government promulgated the National Archives Ordinance for the collection, preservation, maintenance and administration of the non-current and permanently valuable records and archives of the government.

The main objectives of the National Archives of Bangladesh are: a) to increase knowledge by providing information to the government agencies and to the public, and b) to strive for efficiency and economy in the administrative machinery through systematic and modern records management practice in the government agencies.

The National Archives of Bangladesh 1. organise effective records management system for various government departments and agencies, including filing system, retention plans and temporary storage in records centres, disposal schedules and standards for the selection of records for permanent preservation; 2. conserves,

arranges and describes the permanently valuable records in archives and record offices to improve their accessibility within the general information system; 3. renders reference services to the administrative agencies and the researchers; 4. compiles national register of archives; 5. ensures smooth running of archives and records management programmes; 6. renders reprographic services for reference purposes; 7. keeps contact with the national and international archives associations; 8. ensures international cooperation and advise in archival field; 9. co-operates with libraries and documentalists in the use of modern techniques of storage, conservation and retrieval; and 10. organises and offer professional training.

The National Archives of Bangladesh is operated by 21 people. It occupies a floor space of 2,753 sq.ft. There is a space of 1,050 sq.ft. for the readers' use. At present, the National Archives of Bangladesh has a collection of more than 6 lacs of valuable records and documents acquired from various agencies, according to the relevant provision of the National Archives Ordinance, covering the period from 1760 to 1961. The main series of the records include: a) Government of Bengal records; b) East Pakistan records, c) Dacca Divisional Commissioner's office records, d) institutional/private collections; e) maps gazettes, press clippings, and newspapers and f) microfilm from IOLR, London.

A National Archives Advisory Council, Constituted in accordance with the provisions of the Ordinance, advises the government on all matters relating to the public and private records and archives. The records remain the property of the creating agencies, but the National Archives of Bangladesh acts a custodian only. The National Archives of Bangladesh has the following sections: a) Records collection; b) Record management; c) Repair and preservation; d) Research; e) Training in archive; f) Record acquisition, preparation of disposal schedule, appraisal and elimination of records, and g) Archives management: preparation of finding aids, arrangement of records, preservation and rehabilitation of records, archival library, supply of information and exhibition, compilation and publication.

The National Archives of Bangladesh provides reference service to the scholars who come to consult its valuable collection. A large number of scholars both from home and abroad have been using its collection. There are facilities for reprographic services for researchers. The National Archives of Bangladesh, a member of I.C.A and SWARBICA, has published its annual reports from 1973 to 1989; speeches on Sher-e-Bangla A.K. Fazlul Huq at the Legislative Council of Bengal, V.1(1918-1937); Bulletin of dissertations and theses done by the Bangladeshi scholars; and SWARBICA journal no. 3.

The presents democratic government has taken up a project to construct a building for the National Archives of Bangladesh at a cost of Tk. 5 (five) crore during the Fourth five-year Plan period. For the nation's interest, it is important to develop a national archival system for the collection and preservation of non-current government records of historical value, because the archives play a role in the coordination and integration of data storage for the whole of public administration of the country. The role of archives and records administration as the common memory of administration lies in its being a centre for administrative information. On the other hand, archives are the evidential documentation of the political, social, economic and cultural history of the country.

NATIONAL HEALTH LIBRARY AND DOCUMENTATION CENTRE

The number of health and medical science libraries increased to a great extent after liberation of Bangladesh and resulted in the emergence of the National Health Library and Documentation Centre (NHLDC), Mohakhali, Dhaka in 1974.⁽¹⁰²⁾ The NHLDC serves as the centre for the biomedical information network within the country for the

102. Ahmed, Zakiuddin. *The national libraries of Bangladesh: their present status and future ... national information agencies*. Eastern Librarian, 1985; 10:38.

sharing of resources. It has a collection 30,500 volumes including 15000 bound periodicals and 250 current subscriptions. It is a national focal point of Health Literature, library and Information Service (HELLIS) network organized by the World Health Organization (WHO) for South East Asia Region.

In 1973 the Asia Foundation conducted a survey to assess the damages, caused by the *War of Liberation* on medical education and on the environment of libraries. On the basis of the survey the Asia Foundation recommended the immediate establishment of a *central information agency* to meet the information needs of the health professionals of the country. As a result of this, the National Health Library and Documentation Centre was established in 1974 at Mohakhali, Dhaka based on an agreement between the Asia Foundation and the Government of Bangladesh. The British Council also presented some biomedical books and journals of British origin on several occasions under the ODA Book Presentation Programme.

The aims and objectives of NHLDC are to: 1. Collect, organise, and preserve all health science literature issued in the country and abroad and promote their use; 2. Establish National standards and criteria for health science library activities; 3. Provide leadership among the health science libraries of the country for planning, developing, and promoting information services; 4. Conduct training courses for librarians and library users; 5. Conduct research on the development of sound library and information systems and services; and 6. Provide leadership in the national programme for cooperative acquisition of foreign materials.

The library's functions include: 1. preparation of the national bibliography on health science publications and indexing of current and retrospection literature published in the indigenous health science serials; 2. offering bibliographic services to provide access to recorded information manually and with microcomputer; 3. contributing to national and international bibliographical projects; 4. preparation and publication of a directory of health science libraries and librarians, taking part in the resource network, newsletters, library manuals, and union catalogue of periodicals; 5. production of audio-visual materials for teaching, research and clinical use; 6. analysing, synthesising and evaluating learning resources and making them available for use; 7. serving as a clearing-house for the exchange of information at national and international levels, and also serving as the coordination centre for cooperative activities; and 8. providing information services to the government and to the library patrons.

The library has a total of 34 staff members and has a total budget of Tk. 17,64,000 (1992-1993), of which Tk. 6,09,000.00 are spent for the purchase of books and journals. WHO provides a fund of US\$ 34,000- per year for journal subscriptions. It has also provided personal computers and photocopier and assistance for publishing library publications. NHLDC has a total floor space of 10,000 sq.ft.

NHLDC has four functional units: a) Administration; b) Technical services c) Information services and d) Audio-visual teaching. The library has the following equipment: microcomputers, microfiche reader-printer, photocopier, duplicating machine and overhead, slide, film-strip and sound projectors. Photographic equipment includes: cameras, copier, Polaroid camera, black and white automatic processor, manual colour transparencies and print processing equipment micro-photo equipment. Dry mounting equipment, etc. NHLDC has a collection of 15,000 books and 15,000 bound journals. It receives 141 foreign journals on subscription and receives 85 indigenous journals (90% on complementary basis). It has also 5,000 microfiches, 150 motion pictures, 2590 slides, 22 tapes, 101 filmstrips and 18 CD-ROM discs.

The library has been declared as the National Focal Point of Health Literature, Library and Information Services (*HeLLIS*) Network activities of the WHO-SEARO. Under this network activity, the library procures photocopies of journal articles for the users, free of charge, not available locally from a) regional sources; b) extra-regional sources. NHLDC indexes locally published health science current literature and has plans to produce a national bibliography of health sciences literature. It prepares a union list of periodical holdings of libraries participating in the network. ^{Also} Provides literature searches manually as well as through MEDLINE databases on CD-ROMs available at the library; produces audio-visual media for instructional and research purposes, offers photocopying, service publishes a HeLLIS newsletter, and offers a continuing education programme for the librarians participating in the network and for the users of the networking services. The library maintains inter-library loan relationships with major health science libraries, including the ICDDR,B library.

BANGLADESH NATIONAL SCIENTIFIC & TECHNICAL DOCUMENTATION CENTRE (BANSDOC)

BANSDOC, originally a branch office of the then Pakistan National Scientific and Technical Documentation Centre (PANSDOC), started functioning in 1962. After the Independence of Bangladesh, it was placed under the Bangladesh Council of Scientific and Industrial Research (BCSIR) in 1972. As per the provision of the National Science and Technology Policy of Bangladesh, announced in 1986, the BANSDOC was placed under the administrative control of Science and Technology Ministry in 1987 and was developed as an independent organisation. The National Science Library, which was established and developed at the direction of *Shaheed* President Ziaur Rahman, was merged with the BANSDOC in the same year. The Policy envisages the creation of a 3-tier S&T information system in the country with

the BANSDOC as the apex organisation (*1st tier*) having 4 sectional documentation centres as the *2nd tier*, and the individual institutional libraries and documentation centres as the *3rd tier*.

BANSDOC has been designated as the national focal point of the scientific and technological information system in Bangladesh. It has also been functioning as the national focal point of many regional and international scientific and technological information systems in the world, including the SAARC Documentation Centre (SDC) established in New Delhi, India.

The principal aim is to provide scientific and technological information to scientists, technologists, engineers, doctors, industrialists, planners, and policy-makers with the ultimate goal of socio-economic uplift of the country. The functions of the BANSDOC include: a) collection, processing, compilation and storing of information and data in all fields of scientific research and experimental development, including natural sciences, agriculture, medicine, engineering, and industrial technology b) dissemination of such information and data to researchers active in all these fields, irrespective of their affiliation, and c) assistance to scientists in establishing contacts with scientists working in similar fields in other countries of the world.

BANSDOC is headed by a director, and has a staff of 64 personnel, consisting of 19 officers and 45 staff. It has the following functional divisions: a) Establishment b) Accounts; c) Documentation; d) Reprographic e) Bibliographic f) Library g) Computer. For the financial year 1993-1994, the total amount of revenue budget is Tk. 75.00 lacs and the development budget is Tk. 20.00 lacs allocated by the Government of Bangladesh. BANSDOC is housed in a 4-storey building and has a total floor space of 25,000 sq.ft.



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Facilities available and services offered: Library information and reference services are provided with the help of a collection of about 14,000 books and 400 journal titles on different branches of science and technology. BANSDOC subscribes to about 182 national and international serials at a total cost of Tk. 20.00 lacs annually. Books and serials are selected and procured at the advice of a National Committee for Selection of Books and Serials. The library is kept open to its users for 10.5 hours from 8.A.M. except the government holidays. BANSDOC procures documents from home and abroad in response to specific requests. Through the Scientific Content Service, it helps that scientist who wishes to contact scientists abroad actively engaged in the same field of interest. It also offers translation service on a limited scale. In response to specific requests, the BANSDOC staff compiles lists of references of published literature. BANSDOC also compiles and publishes bibliographies on scientific and technological information materials of national importance.

BANSDOC is well equipped with audio-video systems, microfilms, microfiches and photocopying facilities. In response to specific requests, the BANSDOC makes microfilm or photocopies as desired by the users. Slides and transparencies are prepared for seminars, symposia, and conferences for the speakers. A photocopying machine is placed at the disposal of library users to facilitate dissemination of information quickly.

The Centre introduced computer service in 1988. It has personal computers, laser and dot-matrix printers, CD-ROM database on life sciences collection, and CD player. Users can get the following facilities and services: a) document-delivery, b) bibliography compilation, c) micrographic (microfilms, microfiches, etc.,) photographic (general press micro and macro photography, slides, transparencies, etc., d) photocopying, e) spiral binding, f) audio and video materials lending, g) reprographic and photographic expertise consultancy and training, h) photographic

and reprographic laboratory (film processing, development, printing etc., I) computer database searching and printouts of all sorts of research materials in laser/dot-matrix printing from supplied floppy disk; j) library use for reading photocopying and ready reference service and k) auditorium hiring for seminars, conferences, workshops, meetings, etc.

BANSDOC has some other impressive database, e.g. A Directory of Scientists and Technologists of Bangladesh Living Abroad (1994); Bangladesh Science and Technology Abstract (v.17, 1993) and Current Scientific and technological Research Projects of Bangladesh (1993).

Publications of the BANSDOC include: a. Directory of Scientists and Technologists of Bangladesh; b. Bangladesh Science and Technology Abstracts; c. Survey of Research and Development activities in R&D Organisations of Bangladesh; d. Current Scientific and Technological Research Projects of Bangladesh; e. National Catalogue of Scientific and Technological Periodicals of Bangladesh; f. Science and Technology Information Newsletter (Current Awareness Service.)

The library is used by students, teachers, scientists, technologists, engineers, doctors, technicians, industrialist, businessmen, planners, policy-makers, etc. All types of referral and reference services are offered to all categories of library users as and when required.

Future development: BANSDOC has introduced new cooperation programmes of activity with some national regional and international information centres. With the aim of rendering more rapid and effective services to users, the BANSDOC will introduce modern information technology, such as Local Area Network and Wide Area Network, on-line system, fax, electronic mail, satellite communication for the automation of its various services, so that the BANSDOC may be established as a centre of excellence for the central repository of all scientific and technological literature and information in the country, and so that it can enter into the global information network system.

NATIONAL SCIENCE LIBRARY (NSL)

The National Council for Science and Technology prepared a project proposal for a National Science Library for incorporating in the 2nd Five Year Plan: 1980-85.⁽¹⁰³⁾ This was a massive project aiming to meet the long felt requirements of educationists, scientists, technologists, researchers and students of all levels. In 1981, the National Science Library (NSL) was established under the administrative control of the Science and Technology Division of Ministry of Education to support the information needs of scientists and technologists of the country. Initially, the NSL had developed a collection of 5000 books, and its management was entrusted on The Bangladesh National Scientific and Technical Documentation Centre (BANSDOC), which was established actually in 1963 as a sub-office of Pakistan National Scientific and Technical Documentation Centre (PANSDOC) at Dhaka in the premises of the then East regional laboratory of Pakistan Council of Scientific and Industrial Research (PCSIR).⁽¹⁰⁴⁾ NSL was, however, merged with the BANSDOC in July 1986. The BANSDOC is under the direct control of the government. It has a collection of 9200 volumes including 200 volumes of bound periodicals and 160 current subscription to journals.

NATIONAL AND INTERNATIONAL NETWORK

Attempts have been made, from time to time, by specialised libraries to contribute to international data bases at regional, national and international levels for networking, namely Agricultural Information System (AGRIS); Health Literature, Library and Information Service (HeLLIS); Development Science Information System (DEVSIS); Asia-Pacific Information Network for Social Sciences (APINESS), Development Information Network for south Asia (DEVINSA); Information Network on Rural Development (INRD) and population Information Network (POPIN). In all these cases it has not been possible to develop an on-line database; information is being exchanged by way of floppy disks or CD ROM. The librarians and the scholarly community in Bangladesh

103. Parker, JS. Bangladesh public library survey: final report. London: Library Development Consultant, 1979. vol. vi:45.

are aware of the need to develop an on-line national database of its research materials and exchange of information internationally. This is evident from the fact that on May 23, 1994 there was a workshop on "Electronic Networking in Asia" held at ICDDR,B attended by 24 Bangladeshi delegates with two consultants from India. Also there was a National Seminar on *Preparing the Libraries and Librarians of Bangladesh for the 21st Century* held under the auspices of the Library Association of Bangladesh in 1993.

There is an approved project, *Automation and Networking of Science and Technology Libraries in Bangladesh* to be executed under the guidance of BANSDOC. According to the Director of BANSDOC it will be implemented very soon. This 25 million Taka Project will be executed in three phases. The first phase will concentrate on creating local databases at the following libraries: Bangladesh National Scientific and Technical Documentation Centre (as the central host) Dhaka University, Bangladesh University of Engineering and Technology, Bangladesh Council of Scientific and Industrial Research, Bangladesh Agricultural Research Council, Institute of Post Graduate Medicine and Research and National Health Library and Documentation Centre. The second phase will link these database through Public Switched Telephone Network.

In the above a very brief statement of the libraries of Bangladesh emphasizing the position of the use of new technologies has been stated. The main purpose here was to focus the status of the use of new technologies. The above analysis will show that the position of the libraries in respect of the use of new technologies is not at all satisfactory in Bangladesh. Here the authority of the institutions and the librarian are not mainly responsible for this deplorable position. The libraries are facing immense problems in using new technologies. But still they are interested and trying their best to use and to install more new technologies in their libraries. This is also the demand of the research scholar, as such these problems will be thoroughly discussed in the relevant chapter for the benefits of the libraries in Bangladesh in using new technologies.

***DEVELOPMENT OF NEW TECHNOLOGIES
REFERENCE TO LIBRARY USE***

CHAPTER FOUR

DEVELOPMENT OF NEW TECHNOLOGIES REFERENCE TO LIBRARY USE

There have been political revolutions, religious revolutions, scientific revolutions and so on. The ever recorded increasing masses of knowledge in printed and electronic media at an unprecedented rate in a vast variety of forms, have led us to age of information revolution. Communication of right information to the right user at the right time in the right form⁽¹⁾ is the life-blood of research and development (R & D) activities. Just as human body will falter or die if the flow of blood is interrupted, the progress of knowledge will be impeded unless it flows freely within the researcher's community. This realisation in our era implies that the older patterns of processing information no longer fit the present reality. During the last two decades, the developed countries of the world have automated a wide range of library and information activities such as acquisition, descriptive cataloguing, catalogue maintenance and production, circulation control, serials control, reference service, indexing, abstracting, current awareness service, selective dissemination of information (SDI), textual analysis, use of modern information technology in general, and computers in particular.⁽²⁾ The speed, accuracy, storage capacity, manipulating flexibility, data handling capability have embarked a new era of library and

1. Ranganathan, SR. Reference service. 2nd edn. Bombay: Asia Publishing, 1961. p.68.

2. Saffady, William. *Library automation: an overview*. *Library Trends*, Winter 1989; 37(3):269.

information services. Joseph Barker has expressed his views that “during the past decades most of the countries have reexamined and revised most of their respected social institutions. Some have been rejected. Cultural and social norms are questioned almost daily in the printed and electronic media. In short, this is a era of stressful change brought on by convulsive waves of shifting values on every front”.⁽³⁾

Changes is not new to libraries, of course, that what is new is the callapsed time-scale of change. In the past change was faced as it happened, but lately social and technological alternatives have occurred at so great a rate that change must be delt with continuously. The order of change is entirely different from anything which came before. This change may be called revolutionary or evolutionary, what counts is the degree to which such change will affect the library’s activities in services are concerned. “As one librarian put it recently, ‘the trouble with our times is that the future is not what it used to be.’⁽⁴⁾

New Information Technology is a comparatively recent term found in the literature of library and information science. The term first appeared in Library and Information Science Abstracts in 1975 but did not assume regular use until the early 1980s; it has been being gradually replaced by ‘new information technology’. Rowley said in his Info-Tech that ‘information technology will usually be recognised as a lusty, if somewhat precocious child of the 1980s, but for most people and many librarians it was particularly brought to prominence by Information Technology year 1982 (IT82).⁽⁵⁾ In the library community there were noticeably mixed reactions to IT82, some were totally negative, others quite enthusiastic. However, it has been quite obvious that since that date a

3. Becker, Joseph. Libraries, societandtechnologicalchange. LibraryTrends, Winter 1978: 409.

4. *Ibid.*

5. Rowley, Jenny.. Infor-tech: a guide for young professional librarians. London: ALA, 1987. P.4.

much greater awareness of information technology is generally apparent. This is reflected, for example, in the significant increase in the demand for home microcomputers during the early 1980s and general expansion of interest in both. Since the 1960s, libraries and information services have used modern technology in general, and computers in particular, to automate a wide range of administrative, public and technical services.⁽⁶⁾

The use of information technology can be traced back well before the 1980s. The literature on librarianship is well-supplied with books and articles describing mechanism or automation⁽⁷⁾ in many types of libraries since the publications used in libraries, have a related history of computer-aided production. But the significant development which has enabled us to proclaim the birth of Information Age and the more venturesome the prospects of the *paperless society* and *electronic library*, is the convergence of microelectronics and telecommunications, allowing phenomenal storage and processing of data together with highly efficient transmission. This was new in the 'new technology'. It must be borne in mind that libraries and information services have always been able to store, process and transmit data in various ways. There

6. Saffady, William. *op.cit.*

7. The term automation was coined in the early 1940s to describe those processes in which mechanisms are used for performing tasks that previously required the attention and control of humans. Since then the term has been applied to a wide variety of automatic machinery and automatic systems, and is commonly used to describe any operation in which there has been a substantial substitution of controlled mechanical, chemical, or electrical action for human effort or intelligence. Thus it became common to call an operation "automated" if it was substantially more automatic than its predecessor. (a) With the development of computers and the concepts of machine logic and control, a more sophisticated concept has evolved. Automation may be said to be the performance of automatic operations directed by programmed commands combined with automatic measurement of action, feedback, and decision-making control. Automation is the most striking and important creation of the new scientifically based term.

a. New Encyclopaedia Britannica. Chicago: Encyclopaedia Britannica, 1981. p.2:505.

b. Burke, John G, ed. The new technology and human values. California: Wadsworth Publishing, 1966.p.105

c. Portion of the statement of Mr John Diebold before the Joint Economic Committee, Sub-committee on Automation and Energy Resources, 86th Congress, 2nd session, in New views on Automation (Washington DC). Mr. Diebold is among the top experts in the field of automation.

d. *Ibid.* p.107.

exists little that is totally new. It is the scale, size and speed that is different. An important concept for the librarian today to grasp is that information technology merely provides new tools to master and new skills to learn.

The rapid development and introduction of new technologies libraries and information services have been widely expected to lead to sweeping changes in ways that libraries are organised and managed.⁽⁸⁾ The change has been both rapid and revolutionary, and the future will bring even more rapid and radical changes in gathering, processing, and disseminating. J. Hartley and others stated that "Recently, however, new technologies have become widely available. Microcomputers, word processors, videotex, electronic-mail, teletex, facsimile transmission, telewriting, satellite communication, laser, digital disc, etc. are developed to coup with the large demand of information seekers".⁽⁹⁾ However, the countries of the developing world, including Bangladesh, are still faltering to adopt these new tools in their libraries and information systems. Before drawing a comparative picture of the use of new technologies in the library and information services different information services tools need to be discussed as briefly as follows:

PUNCH CARDS

The 80 column Punched cards were one of first input (Storage) media and are still commonly used. Data was coded by patterns of holes punched of stiff papers.⁽¹⁰⁾ These are familiar in many ways to us because these are used for utility bills, course registration at colleges and universities, pay roll checks in the factories, notices to renew subscriptions or books in the libraries and

8. De Klerk, Ann and Euster, JR. *Technology and organizational metamorphosis. In: Library Trends*, 1989 Winter, 37(4):457.

9. Hartley, J. et al. *Online searching: principles and practice*. London: ASLIB, 1990. p.197.

10. Rowley, Jennefer. *The basics of information technology*. London: Clive Bingley, 1988. p.38.

information centres, or to pay insurance premiums, and a host of other computer applications.”⁽¹¹⁾

Perforated paper cards were first used in the weaving industry. As early as 1725, perforated paper was employed in the operation of a loom designed by Basile Bouchon.⁽¹²⁾ Basically, the loom worked in this manner: lines of holes were punched into a roll of paper in accordance with the design to be woven. When this coded paper was pressed against a row of needles, those that lined up with the holes remained in place; the others moved forward. The loom's action, as controlled by these selected needles, formed the pattern of the fabric. Bouchon's loom was the simplest kind of draw loom, using only a single row of needles, but it was the beginning.

In 1801, Joseph Marie Jacquard⁽¹³⁾ invented an automatic textile loom. This loom used an endless chain of punched cards that rotated the needles of the loom. Charles Babbage,⁽¹⁴⁾ in the design of his analytical engine, borrowed the punched card principles from Jacquard's loom. Bouchon and Jacquard used their punched paper and cards to provide an effective means of communicating with the loom. The language was limited to two words : hole and no hole. The same binary system is all but universal in today's machine communication.⁽¹⁵⁾ It was not until about twenty years after Babbage's death that the use of punched

11. Rice, James. Introduction to Library automation. Colorado: Libraries Unlimited, 1984. p.13.

12. Spencer, Donald D. Introduction to information processing. 3rd. edn. London: Charles E. Merrill Publishers, 1981. p.134.

13. Joseph Jacquard (1752-1834), while scientists concentrated on building machines that would reduce the pencil work in mathematical calculations, other people brought forth inventions that would revolutionize the economy of Europe.

14. Charles Babbage (1792-1871), an English Mathematician and a mechanical genius, Babbage devoted 37 years to perfecting a calculating machine that could be used to construct mathematical tables. Although his project did not succeed because of inadequate technology, his underlying logic was sound, leading to the modern day computer. Babbage's ideas were so advanced and standard, so high, that most efforts to realise his plans during his lifetime were unsuccessful. He was a man ahead of his time.

15. Spencer, DD. *op.cit.*

cards was applied to data processing. In 1887, the first system of punched card tabulating machines was developed by Herman Hollirith⁽¹⁶⁾ in response to an immediate need. Because the population of the United States had grown so fast in the later half of the 19th century, increased from 50 to 63 million in the decade after 1880,⁽¹⁷⁾ it was estimated that result of the 1890 census could not be processed with in 10 years, thus resulting in a great delay.⁽¹⁸⁾ To shorten time, Hollirith built a set of machines to reduce the processing time required to obtain the 1890 census.⁽¹⁹⁾

"The 1890 Census data were placed on cards by means of holes cut with a hand-operated punch. The cards were individually positioned over mercury-filled cups. Rows of the telescoping pins descending on the card surface dropped through the holes into mercury, thus completing electric circuits and causing pointer on appropriate counting dials to move on position. This machine allowed the 1890 Census of 62 million people to be completed in one- third the time needed for completion of the 1880 Census of 50 million people of the United States."⁽²⁰⁾ "In 1907, James Powers, one of the Census Bureau Machine shop experts, developed a punched card system that was used in the 1910 census. The Powers machine had 240 keys corresponding to different items on the census questionnaire and operated somewhat in the manner of a typewriter or adding machine."⁽²¹⁾ All the necessary keys for punching a given card were

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16. Herman Hollirith (1860-1929). As a Statistician and employee of the Census Bureau, Hollirith proposed using punched card in conjunction with electro-mechanical relays to accomplish simple additions and sorting needed in the 1890 census. He set up a company to manufacture his punched card tabulator, and it became the present IBM Corporation.
 17. Sanders, Donald H. *Computers today*. 2nd edn. New York: McGraw-Hill Book, 1985. p.32.
 18. Robichaud, Beryl, etal. *Introduction to information processing*. 4th edn. Illinois: Glencoe, 1991. p.28.
 19. Athey, Thomas H and Zmud, RW. *Introduction to computer and information systems with basic*. Illinois: Scott, Forseman, 1986.p. A-8.
 20. Spencer, DD. *op.cit*. p.135.
 21. *Ibid*. p.137.

set before any of the holes actually were punched. This machine increased the accuracy of punching and the speed with which it was done.

A punched card is divided into rows and columns. Each column usually encodes one character which also appears in its usual readable form at the top of the card. The standard card measures 18.7 cm x 8.3 cm (7 3/8 inch x 3 1/4 inch) and has 80 vertical columns with rows numbered 0-9.⁽²²⁾ The card is cut from a durable paper stock that provides strength and long life.⁽²³⁾ Most newer cards have round corners. These can, therefore store eighty characters of information per card. Horizontally, each card-column is divided into 12 rows. These 12 rows are the designated areas in which punch may be placed. Rows from 0 to 9 are usually printed on the card. The top two rows 11 and 12, normally are not printed on the card.⁽²⁴⁾ "Cards are encoded by a keypunch. Its keyboard is much like a typewriter's, and it punches the holes in a card according to whatever binary code it is designed to punch."⁽²⁵⁾ The cards are subsequently read by a machine called a card reader. Some read the cards mechanically, and some read the cards photoelectrically.⁽²⁶⁾

Punched cards can also be produced by a computer on a device called a card punch. Other punch card devices include: sorters, which require a deck of cards; reproducers which duplicate copies of punched cards; a verifier, which check the data on a card for accuracy.⁽²⁷⁾ A card is usually used for storing a single record such a user's name and address, the title and other data about a serial, or

22. Robichaud, Beryl, *op.cit.* p.93.23. Rice, James. *op.cit.*

24. Robichaud, Beryl, *op.cit.* p.91-2.

25. Rice, James. *op.cit.*

26. *Ibid.*

27. Riaz, Muhammad. Library automation. New Delhi: Atlantic Publishers, 1992. p.44.

a publisher's name, address, and other data in the library and information services. Because of this, punched cards are often called unit records, and their associated peripheral devices are called unit record equipment.⁽²⁸⁾

William Saffady mentioned that "as early as the 1930s United States had used punched cards in combination with sorters, collators and other equipment as an alternative to manual record keeping"⁽²⁹⁾ in the library as well. The chief defect of punched cards was the slow speed of operation. Fundamentally, as a medium, the storage density of punched cards are far too low and although the possible reading rate has been increased several orders of magnitude-from 10 characters per second to over 2000 characters per second-it is still a relatively slow information transmitting method. Another defect of cards was that these provide only permanent, non-erasable storage.

PUNCHED PAPER TAPE

Paper tape has an advantage of 'filing integrity',⁽³⁰⁾ it served much the same purpose as punched cards. It can be used as either an input or an output medium for a data processing system. This means that the records stored on the medium are always in sequence. Data are encoded on tape in much the same way these were done on punched cards. The tape is divided into columns (usually eight spaces wide) which run along with width. Information is encoded by punching the appropriate pattern of holes in each column. Since the paper is continuous (not divided into discrete units like cards) it can contain records of any length.⁽³¹⁾

28. Saffady, William. *Introduction to automation for librarians*. 2nd edn. Chicago: ALA, 1989.

29. Mahapatra, Piyushkanti. *The computer in library science*. Calcutta: World Press, 1985. p.25-6.

30. Rice, James. *op.cit.* p.14.

31. *Ibid.*

Paper tape was originally developed for transmitting telegraph messages over land wires or between ships at sea. Paper tape is now produced as by-product of many document-preparing machines. Paper tape punches are often attached to electric typewriters, desk calculators, cash registers, adding machines, teletypewriters, or accounting machines so that paper tape records can be produced at the same time when other operations are being performed. Combining document preparation with the creation of a machine-readable medium can eliminate a separate key-punching operation and hence reduce the cost of preparing for entry into a computer system. Paper tapes are available in several different widths. However, for use with data-processing equipment, the 1-inch size most often used. Paper tape is handled in short strips only a few feet long or in reels of up-to several hundred feet. Information is recorded as holes punched across the width of the tape. Data are punched and read as holes located in eight parallel channels running horizontally along the length of the tape. One column of eight possible punching positions across the width of the tape is used for coding numeric, alphabetic, and special characters and functions.

Paper tapes being used for temporary information storage. It has the advantage of "file integrity". It means the records stored on this medium are always in sequence. Its popularity is due to the fact that the punching and reading equipment is relatively simple and inexpensive and provides a permanent storage medium. Fundamentally, as a medium, the storage density of punched paper tape is far too low and the defect of punched tape was these provided only permanent, non-erasable storage.

The paper tape is used to prepare source documents or other messages. The input data and output information being produced by the terminal can be punched

into a paper tape then later entered into a computer by a paper tape reader⁽³²⁾ in the libraries. The paper tape is relatively inflexible and has a slow data transfers speed when compared with magnetic media, and so persists in only a few applications.⁽³³⁾ Paper tape provides greater data density than punched cards and is cheaper than cards.⁽³⁴⁾

TYPEWRITER

A self-contained, standard-alone machine that prints characters one after another on paper. Its essential parts are a key board, a means for printing such as by raised type or thermal transfers, a linked ribbon, a platen for holding paper as it is imprinted, and a mechanism for advancing position as imprinting takes place. During the 19th century, the US economy was transformed one based on agriculture to one based on industry. Huge transactions and correspondence occurred in industrial mobilization a transportation. What few people realise is that the changes that took place in the business office had an impact as well. At the beginning of the 19th century, most business were small firms serving local markets. The difficulties of processing business paperwork with pen and ink and of buying and selling over long distances discouraged firms from expending. By the end of 19th century, however, the telegraph, the telephone, and the typewriter had laminated these barriers. As a result, many large businesses could market and sell their products nation-wide. Without these advantages, the industrial society might never have come about.

Samuel Morse's invention of the telegraph was a key factor. Customers, suppliers, and branch offices could now be located far from a firm's main

32. Sanders, Donald H. *Computers today*. 2nd edn. New York: McGraw-Hill, 1985. p.141.

33. Rowley Jennifer. *op.cit.* p.38-9.

34. Sanders, Donald H. p.147.

offices, factories, and warehouses. Also, the telegraph was faster than mailing information on paper. In addition, the development of Morse code showed how complex messages could be represented with only two symbols, the dot and the dash. Today's computers use a similar method of coding. With Alexander Graham Bell's invention of telephone, attitudes about communication changed even more. The convenience of telephone contact allowed a firm to have its managers located in adjoining offices, in different buildings at the same site, or in neighbouring cities. This marked the beginning of business's growing dependence on its communications and information processing systems.

"Surprising as it may seem, the typewriter was not accepted into the office as quickly as the telegraph or the telephone. As described in *Computers at Work: 'A Brief History of the Typewriter'*, by D. Sutherland. In: A. Solomon. *Remember this? Inc.*, October 1982. pp.63-8, and 70", it seemed, at the time of its invention, there was no practical need for swift written communication. A number of circumstances had changed this situation by the late 1880s. Business had become dependent upon the rapid communication of the telegraph and the telephone. Also, larger businesses were generating more written materials. In addition, the early typewriters' technical problems had been solved, and more people realised the value of producing high quality business documents quickly. By the 1890s, over a million typewriters had been sold."⁽³⁵⁾

The invention of various kinds of machines was attempted in the 19th century.⁽³⁶⁾ These were operated manually, electro-mechanical, or electronically, most were large and cumbersome, some resembling pianos in size and shape. All were much slower to use than handwriting. Each mode of operation

35. Athey, Thomas and Zmud, R.W. *op.cit.*

36. New Encyclopaedia Britannica. 15th edn. Chicago: Encyclopaedia Britannica, 1993. p.12:86.

represents a further evolutionary stage in development. Finally, in 1867,⁽³⁷⁾ the American inventor Christopher Lathan Sholes read an article in the journal *Scientific American* describing a new British-invented machine the first practical typewriter. This second model, patented in 1868, wrote at a speed far exceeding that as a pen. It was crude machine, but Sholes added many improvements in the next few years, and in 1873 he signed a contract with *E. Remington and Sons*, Gunsmiths, of Illinois, New York, for manufacture. The commercial manual typewriter was first introduced and placed on the market in 1874,⁽³⁸⁾ and the machine was soon renamed the *Remington*.

The first typewriter had no shift key mechanism - it wrote capital letters only. The problem of printing both capitals and small letters without increasing the number of keys was solved by placing two types, a capital and lowercase of the same letter, on each bar, in combination with a cylinder-shifting mechanism. The first shift-key typewriter-the Remington Model-12 appeared on the market in 1878. The significant advance in the typewriter field was the development of the electronic typewriter, the basically a mathematical typewriter with typing stroke powered by an electric-motor drive. The typist initiates the key stroke, the carriage motion, and other controls by touching the proper key. The actuation is performed by the proper linkage clutching to a constantly rotating drive shaft. The first electrically operated typewriter, consisting of a printing wheel, was invented by Thomas A. Edison in 1872, and later developed into the thicker-tape printer. The electric typewriter as an office writing machine was pioneered by James Smithers in 1920.⁽³⁹⁾ Actually, an electrically power typewriter was commercially introduced in 1934.

37. *Ibid.*

38. McGraw-Hill encyclopedia of science and technology. 7th edn. New York: McGraw-Hill, 1992. V.7:646.

39. *Ibid.*

In 1961 the first commercially successful typewriter based on a spherical type-carrier design was introduced by the International Business Machines (IBM) Corporation. The sphere-shaped typing element moves across the paper, tilting and rotating as the desired character or symbol is selected. The motion of the element from left to right eliminates the need for a movable paper carriage. The portables of the late 19th century were slow, awkward, type wheel machines. In 1909, the first successful portables appeared on the market. By the 1950s practically every typewriter manufacturer produced a portable typewriter; all of them were type-bar machines similar in operation to the office machines. Designed with lighter parts than those of standard models, portables are more compact but less sturdy. Electrical operation of portable typewriter was introduced in 1956.⁽⁴⁰⁾ As the 1970s drew to a close, electronic typewriters made their debut, offering memory capacity, added automatic functions, and greater conveniences. Further advances in electronic technology have led to added capabilities, including plug-in memory and function diskettes and cartridges; visual displays; printing; and communications adapters.

Basically, the typewriter depends on input from a keyboard operator. The keyboard contains a complete, along with numbers and the symbols commonly used in various languages and technical disciplines. Typewriters have become more efficient and easier to use as the result of continuing technological advances and concern to improve the typist's job. In the early 1980s, typewriters employing a non-impact printing technology emerged. The technology, based on ink transfers by locally applied thermal means such as wire-matrix print head, offers the advantages of increased print speed (in playback mode) and very low noise levels. Even though the trend is expected to

40. New Encyclopaedia Britannica. *op.cit.* p.12:87.

continue toward reducing repetitive and time consuming typewriter operation as newer technology is applied to the design and manufacture of these machines, the role of typist as the initiator of key-strokes is still essential and is expected to remain so.

MAGNETIC STORAGE

Magnetic storage technology, the earliest form of read-write storage, is still commonly used form in the library and information services. Magnetic recording dates back to 1898. But it was not until World War II, that magnetic recording technology has applied to computer storage. The following magnetic devices are now discussed: a. Magnetic Tape, b. Magnetic Disc, c. Floppy Disc, d. Magnetic Drums, e. Magnetic Cards, f. Magnetic Bubble Memory, g. Mass, Cartridge Storage, and h. MICR

MAGNETIC TAPE

Magnetic tape, in one form or the other, has been the workhorse of information storage almost since the beginning of the computer era.⁽⁴¹⁾ Tapes are currently the least expensive information storage devices for large volume of information. Virtually, every type of magnetic tape so far invented has been used for storing data from a computer. The real workhorse of the industry is the reel of 1/2 inch tape.⁽⁴²⁾ Magnetic tapes are used for storing large volume of data. However, because data have to be written onto the tape, or read from it, in a serial fashion, these are mainly used for archival purposes or for transporting files to other locations.⁽⁴³⁾ Magnetic tape is an extremely common input/output/storage

41. Cornell, Joseph A. *Computers in hospital pharmacy management*. London: ASPEN Publication, 1983. p.72.

42. *Ibid.*

43. Burton, Paul F and Petrie, JH. *Information management technology*. London: Chapman and Hall, 1991. p.29

medium in all types of computer systems. Magnetic tape provides a rapid way of entering data into the computer system and an equally fast method of recording processed data from the system.⁽⁴⁴⁾ Information is recorded on magnetic tape as magnetised spots called bits. The recording can be retained indefinitely, or information can be automatically erased and the tape reused many times. Magnetic tape is wound on individual reels or inserted in cartridges or cassettes. Tape on the individual reel is typically 1.27 cm (1/2-inch) wide and 732.52 cm (2400 ft.) long. A full reel of tape weighs about 1.8 kg (4 lb) and can contain information equivalent to that recorded on 400,000 punched cards.⁽⁴⁵⁾

Data are recorded on tracks that run the length of the tape. The spacing between the rows, or channels, is generally controlled during the recording or writing operations. Character densities as high as 1600 per inch are common. Tapes that hold 6250 characters/bits (bpi) per inch are being increasingly used.⁽⁴⁶⁾ It is organised in much the same way as paper tape with the information stored in columns each of which runs across the width of the tape. Each column stores a character or byte⁽⁴⁷⁾ in a binary code (the bits are in magnetised spots on the tape). Magnetic tapes are usually seven or nine columns wide for encoding six-bit or eight-bit binary codes.⁽⁴⁸⁾ The last bit is called a parity bit. It enables devices to check to be sure that each byte is accurate and that no bits have been lost as data are transferred from one medium to another. Magnetic tape is inexpensive and durable, and stores a great deal of densely packed information. Tapes can take the form of reels, cartridge, or cassettes. The computer can read tape much faster than it can read cards-several thousand characters per second.

44. Rice, James. *op.cit.* p.14.

45. Spencer, Donald D. *op.cit.* p.177.

47. In computing, a binary character operated upon as a unit and usually shorter than a computer word. A byte is the smallest addressable unit of storage and is usually eight bits long. The representation of a character.

48. Robichaud, Beryl, et al. p.123.

Magnetic tape is used for long -term or inactive storage in many library and information centres largely because of its affordability. As the chief defect of punched cards and paper tape was the slow speed of operation and as a medium, the storage density of cards and tapes are far too low. Another defect of cards and tape was that these provided only permanent, non-erasable storage. Magnetic tape solves both of these problems. It is much faster than cards and paper tape, and data on magnetic tape can be erased and the tape reused for other data any number of items in the library.

However magnetic tape has got not completely replaced cards or punched tape because it requires more expensive equipment, and it does not provide a unit document like the card. Moreover, the data recorded on magnetic tape is invisible and cannot be interpreted directly by the eye. Yet magnetic tape, represents an almost ideal file storage medium. Information is stored on magnetic tape in, much as with punched tape, but in magnetic form and so it can be easily erased and can be stored at much higher densities. In short, magnetic tape is the basic file medium for virtually every major computer; it provides, the efficient storage and high-speed transfer rate desired; it is erasable, so the stored data can be changed at any time; its use has been well-developed in both numerical computation and business processing . Because the information is stored by means of magnetised particles rather than holes in cards or tape, very much more information can be stored in a small area. In library work, large, large amounts of detailed data may need to be stored, making magnetic media attractive. Since magnetic media are read by electronic rather than mechanical processes, these are all very much faster, though magnetic tape is considerably slower than discs or drums.

4.b. MAGNETIC DISK

A magnetic disk is a thin metal disk, much like a phonograph record, but containing concentric rather than spiral tracks and mounted on a disk storage drive. The recording surface of the disk is covered with ferrous oxide for the purpose of recording data in the form of magnetic spots.⁽⁴⁹⁾ An indexed or "random access" memory of magnetic disk technology was applied to secondary data storage in the library and information services. It provides rapid, random access to data. The technology introduced in 1962,⁽⁵⁰⁾ consists of either an aluminium or plastic platen coated with a metallic material. The device, now is a feature of several electronic data processing systems.

Information can also be stored on disks, which are flat, circular, magnetised devices. In use, these are spun at high speed and accessed by a magnetic pick up (head) that can either read or store information. These are random access devices since the head can skip over several tracks to reach the track with the desired information on it. These are very fast. There are three basic types of disk drive: One type of disk drive accepts portable and flexible diskettes. These diskettes are of two sizes. The 5 1/4 inch disc can hold about 500,000 bytes, and the 8 inch can hold as many as 1 million bytes, depending on the design of the drive. Another type of disk drive has no removable parts, and its magnetic surface is an alloy of high-quality steel. The capacity of this type of device may range from 10 megabytes (106 bytes) to 250 megabytes. The final type of disk is the cartridge disk, which has a hard-surfaced removable platter. Capacity of these devices is basically the same as that of the non-removable ones.

49 Clark, Frank, et al. *Business systems and data processing procedures*. New Jersey: Prentice-Hall, 1972. p.297.

50. *New Encyclopaedia Britannica. op.cit.* p.21:618.

Magnetic disks are probably the most commonly used type of storage media. These provide computer systems with the ability to read or retrieve information sequentially or randomly. The physical characteristics of all magnetic disks are similar. These are much like audio disks, but made of thin metal and coated on both sides with a magnetic material. These are stored in tracks which run in concentric circles on both surfaces of the disk. Information is "written and read" by read-write heads which move across the radius of each disk. Thousands of characters can be stored on each disk and the access time is extremely fast. Each disk can revolve at a rate of several thousand revolutions per minute. Information can be input at a rate of about 200,000 characters per second. The disks are contained in a disk pack.

Disks are mounted on a vertical shaft and are slightly separated from each other to provide space for the moment of read-write assemblance. The shaft revolves, spinning the disks. Data are stored as magnetised spots in concentric tracts on each surface of the disk. Disk units have several hundred tracts on each surface for storing data. The tracks are made accessible for reading and writing by positioning the read-write heads between the spinning disks. The read-write head mechanism is hydraulically to any track position. After horizontal movement is completed to a special tract, the read-write heads can be directed to perform the reading and writing on the tract. A magnetic disk assembly can have several disks. A disk unit with 25 disks can have a storage capacity of over 100 million characters of information. This information can be transmitted to and from a computer at rates of over 300,000 bytes per second.⁽⁵¹⁾ The magnetic disk data surface can be used repetitively. As new information is stored on a track, old information is erased. The recorded data remain recorded

51. Shore, Barry. *Introduction to computer information systems*. New York: Holt-Rinehart and Winston, 1988. p.214.

in the tracks of a disk until these are written over. For computer data-storage application, a collection of as many as 20 disks (called a disk pack) is mounted vertically on the spindle of drive unit. The drive unit is equipped with multiple reading-writing heads.

These features give magnetic disk devices a advantage over tape recorders. A disk unit has ability to read any given segment of an audio or video recording or block of data without having to pass over a major portion of its contents sequentially; locating desired information on tape may take many minutes. In a magnetic disk unit, direct access to a precise track on a specific disk reduces retrieval time to a fraction of a second. Because of their high storage capacity as well as ability to access data directly, agnetic disk systems have become the dominant medium for recording and storing computer data.

4.c. FLOPPY DISK

Small, flexible plastic disks called 'Floppy Disk' was developed during 1970s.⁽⁵²⁾ Floppy disks, or diskette, is widely used in microcomputer systems, small scale business computer systems, word-processing systems, remote terminals, and data entry systems. The floppy disk is a compact, flexible, magnetic oxide-coated disk that resembles a 45-rpm phonogram record.⁽⁵³⁾ There are three sizes of floppy disk: 8, 5.25 and 3.5 inches; the 3.5 inch disks have a rigid protective jacket. They may have data stored on one or both sides, at either single or double density. Depending on the size and type a floppy disk may store between 100 kilobytes to 1 megabytes.⁽⁵⁴⁾ Originally, the floppy disk had a capacity less than 300 kilobytes with average access times in the 150 to 800 millisecond range. In 1981, however, the capacity of the floppy disk has

52. New Encyclopaedia Britannica. *op.cit.* p.7:682.

53. Spencer, Donald D. *op.cit.* p.178.

54. Longley, Dannis and Shain, M. Dictionary of information technology. 2nd edn. London: Macmillan Press, 1985.p.129.

reached one megabyte and greater with access time having been reduced in some cases to under 100 milliseconds. The 5.25 (13.3cm) diameter diskette is also called a minifloppy disk. Information is recorded in a digital fashion on the magnetic surface of the disk while the disk is rotating.⁽⁵⁵⁾ A diskette is easy to handle and easy to store. It is readily interchangeable with other diskettes on the device used to process it like a magnetic tape, a diskette is reusable. Information can be read from a particular diskette location as often as necessary. The flexible floppy disk is a convenient low-cost information-recording medium for initial information capture and a new form of low-cost storage.⁽⁵⁶⁾

Floppy disks cannot store as much information or retrieve data as rapidly as conventional rigid or hard disks, but these are adequate for use with personal microcomputers where low cost and ease of use are often of primary consideration. Compared to the storage capacity of the 'hard' disk, that of such a 'soft' diskette is low - only about 1,000,000 characters. Accessing data on the latter is also slower, but the retrieval time is adequate for most microcomputer application. Advantages of the floppy disk are low cost and virtually unlimited size for information storage.⁽⁵⁷⁾

4.d. MAGNETIC DRUM

Such magnetic recording mediums as drums has been used for data storage since the early 1950s.⁽⁵⁸⁾ Auxiliary computer memories using a magnetic drum operate somewhat like tape and disk units. These store data in the form of magnetised spots in adjacent circular tracks on the surface of the drum as the drum rotates at about 3,000 revolutions per minutes. Drums provide rapid, random

55. Spencer, Donald D. *op. cit.* p.179.

56. *Ibid.* p.180.

57. Cornell, Joseph A. *op.cit.* p.73.

58. New Encyclopaedia Britannica. *op.cit.*

access to stored information. These are able to retrieve information faster than tape and disk units, but cannot store much data as either of them. Probably the simplest magnetic medium is a cylindrical drum coated with magnetic material. Each drum has a specific number of addressable storage locations. The capacity of each storage location varies with the design of the drum and data representation code used. Drum diameter ranges between 3 (Three) and 24 (Twenty-four) inches and to probably 100 (One hundred) channels. However, drums are relatively unsuitable for any large capacity storage, since these are limited to, generally speaking, less than one million bits (around 150,000 alphabetical characters). Hence these are not useful for the storage of large files etc. in a large library.

4.e. MAGNETIC CARDS

This storage device consists of a tray or cartridge of magnetically coated cards. These cards are made of material similar to magnetic tape and have specific areas allocated for storing information. The use of magnetic cards or strips was discovered to remove the limitations passed by magnetic tape. The Magnavox Company and CRAM (Card Random Access Mechanism) have developed equipment, and techniques for high speed handling of magnetic cards. The magnetic cards of Magnavox Co. perform such functions, as sorting, collating and files searching. The system has the inherent flexibility of the unit record system. The system uses laminated 1" x 3" card with a mylar base an iron oxide coating for the recording material. Each of these cards has a storage capacity in excess of 5,000 bits (756 alphanumeric characters). Information is recorded on 18 parallel channels at densities of 100 bits per linear inch using standard magnetic reading and recording techniques.

4.f. MAGNETIC BUBBLE MEMORY

A more recent development is the magnetic bubble memory devised in the late 1970s at Bell Telephone Laboratories.⁽⁵⁹⁾ A newer type of magnetic memory is the magnetic bubble. The bubble memory entails the use of small magnetic domains, which represent 0 (Zeros) or ones (bits). The nice thing about bubble memory is that, when the electrical power is off, the magnetic domains constant-avoiding loss of stored information in the event of a power failure. A bubble memory consists of a thin chip of synthetic garnet about 0.25 inch (6.35 millimetres) square in the upper layer of which microscopic magnetic domains appear, disappear, and move around under the control of an electromagnetic field.⁽⁶⁰⁾ As yet, the magnetic bubble memory has found only limited application for primary storage and is used principally in an auxiliary role. Because the bubble device is basically a serial memory, its retrieval time slower than that of the semiconductor RAM. It shares, however, the mass storage capabilities and non-volatility of such secondary memories as magnetic tape and disk units while being considerably more compact. The Bubble device is ideally suited for microcomputer systems that are used in a harsh environments where non-volatility is crucial. A bubble memory consists of a thin chip of synthetic garnet about 0.25 inch (6.35 millimetres) square in upper layer of which microspic magnetic domains appear, disappear, and move around under the control of an electromagnetic field.⁽⁶¹⁾

Bubble memory permits much more compact storage than heretofore possible. It is all electromagnetic in nature. There are no moving parts. Another advantage

59. *Ibid.*

60. *Ibid.* p.3:508.

61. The new encyclopaedia Britannica. 15th edn. New York: Encyclopaedia Britannica,1993. vol.3 (Micropaedia):508.

is improved access time. Compared to the typical mass storage of magnetic disk and floppy disk, the average access time for bubble memory is about four milliseconds, which is about five times faster than the fastest disk today. However, the problem with bubble memory today is the cost. The cost per character of storage is still much greater than the current storage other technologies.

4.g. MAGNETIC CARTRIDGE STORAGE

Other magnetic media using a magnetic coating to store information have been developed. For instance mass cartridge store has a very large storage capacity because it consists of a honeycomb of cartridge (each 381 cm long and 7.6 cm wide). But due to its slow operation, it has to be used in conjunction with intermediate disk store.

4.h. MICR

There still another magnetic medium is magnetic ink, often called Magnetic Ink Character Recognition (MICR). Very stylised, almost illegible letters are printed in magnetic ink which can then be read by a magnetic ink character reader. The most common application of this medium is in banking where cheques are identified this way.

5. OPTICAL STORAGE

The most exciting new prospect for large-scale mass storage of information for both micro and maxicomputers is the optical disk technology. Optical disks and videodisks have now got prominence in the realm of information and communication. These devices are examined briefly.

5.a. OPTICAL DISKS

An entirely different kind of recording and mass storage medium, the optical disk, introduced during the early 1980s., developed from videodisk technology⁽⁶²⁾ the most sophisticated systems of this kind can store up to 4,000,000,000 bytes far more than the highest capacity magnetic disk units. The optical disk makes use of laser technology: digital data are recorded by burning a series of microscopic holes, or pits, with laser beam into thin metallic disk. Information is encoded by a laser beam on the metallic recording medium of a videodisk platter as a pattern of pits. For information retrieval, the digitally coded data are tracked by an optical laser scanner.

A range of peripheral devices, which use optical processes to store and retrieve data, has become available at prices which make it practicable to link these devices to microcomputers. Most of them use a spinning disk and hence the mode of operation is not unlike that of a magnetic disk, although there are some fundamental differences. There are also other formats, notably optical tape and optical card systems, the latter keeping capable of storing several megabytes of data on a card no bigger than a credit card. Their availability opens up some exciting new ways to use microcomputers.⁽⁶³⁾

Optical disks and videodisks represent an important and rapidly growing technology. A videodisk stores visual images in extremely high density (e.g. thirty thousand pictures on one side) and provides remarkably fast access to individual frames on a disk (e.g. one second average seek-time or less). A videodisk yields extremely high resolution for visual images (pictures, graphics, charts, or prints). his image can be retrieved in motion picture form (for a movie) or still pictures; and it can be retrieved in slow motion or reverse. These

62 Ibid. p.16:644.

63. Burton, Paul F. *op.cit.* p.35

can be accompanied by high resolution sound tracts for music, narrative, or any other form of audio. A videodisk is about the size of a long-playing record, and it is impervious to wear in so many ways that will last almost indefinitely. However, for all practical purposes, a videodisk is a Read-Only-Memory device. This means it can not be re-recorded over and over again like magnetic media. It is for this reason that, to date, most applications of videodisks involve entertainment and storage of information which is not dynamic in nature. Information is stored permanently on the disk, and it is played back (read) or retrieved as needed.⁽⁶⁴⁾ A disk in which the information is etched on the surface as a series of pits and is read by a laser beam compares capacitance disk.⁽⁶⁵⁾

An optical disk is next of kin to a videodisk. Binary digits are stored on this medium optically (using laser light) rather than magnetically. Optical disks store information with much higher density than magnetic disks do, and they provide extremely rapid access. Nearly all optical disks now in use are a form of Read -Only-Memory devices but a great deal of research is currently underway. One erasable disk has just been announced and another systems in use is a system that can record on the disk one time but can not re-record.

One advantage of the optical disk is that plastic material used in the disk is not expensive. Optical storage is also now being packaged in other forms beside disks. These includes cartridge and cards. Some of the optical disks in use with microcomputers were developed for, or derived from, products developed for specific purposes not connected with microcomputers. It is, therefore, difficult to categorise them. Using the recording mechanism as a basis, optical disks can be broadly grouped into three categories:⁽⁶⁶⁾

64. Rice, James. *op.cit.* p.16

65. Longley, Dannis and Shain, M. *op.cit.* p.244.

66. Burton, Paul F. *op.cit.*

1. Read-Only -Optical Disk
2. Write-Read Memory (Times) Optical Disk (WORM)
3. Erasable and Re-writable Disk

5.a1. Read-Only Optical Disks

Read-Only disks are prepared in a factory. The data are recorded in the disk surface by a mass-production process. Once the disk has been made, no more data can be added to it: it can be only be read. Broadly speaking there are two types of Read-Only disks:⁽⁶⁷⁾

1. Videodisks
2. Compact disks

Videodisks were introduced to compete with videotape in the consumer market, but they were never a serious competitor because of the inability to record as required. Videodisks use different techniques for recording and playback. One type of videodisk has a needle that *reads* electrical patterns in the microscopic grooves of a disk. These patterns are then transformed into sound and image. A more sophisticated type of videodisk recording technique stores sound and picture “information” as binary code on a pattern of ultramicroscopic dots embedded in plastic.⁽⁶⁸⁾

Videodisk technology-a new invention is based on laser optics which uses light beams to read and write data. Used in conjunction with microcomputers for the storage and retrieval of information, it offers very high density, and quality ratio; random access and a mixed storage format utilising both digital and analogue data. One of the most important aspects of this technology is the

67. *Ibid.* p.36.

68. William, F. The new communication. California: Wordsworth Publishing, 1984. p.170

very high storage capacity-up to 800 million characters of data on one disk. The capability to store both digital and analogue data makes use of the videodisk extremely flexible, since both text (in digital format) and graphics (in analogue format) can be stored on the same medium.

Videodisk used for storing visual images in extremely high density provides tremendously fast access to individual frames on a disk. The disk can be played and viewed just like a TV programme or it can be played frame by frame. However videodisk cannot be re-recorded over and over like magnetic media. It is for this reason that , to date most applications of videodisks involve entertainment and storage of information which is not dynamic in nature. But information is stored permanently on the disk, and it is played back (read) or retrieved as needed in the library. **Compact disk** (CD) is moulded plastic disk for the reproduction of recorded sound. Unlike that of the phonograph disk produced by the mechanical, or analogue, method, the "groove" on the CD is a series of minuscule pits inscribed at varying depths in a outward spiral by the laser of a digital recording instrument. CDs were developed by Phillips and Sony for the storage and playback of audio materials, and have proved to be extremely successful in this respect. Versions of the CDs have been introduced which store digital data⁽⁶⁹⁾ the bestknown being the *Compact Disc-Read Only Memory* (CD-ROM) CDs for home use, introduced in the early 1980s, are 12 cm (4.75 inches) in diameter and store more than one hour of sound.⁽⁷⁰⁾ CD-ROM is designed specifically for machine-readable, computer processable data. Its main feature is that it is a permanent form of storage and the data recorded cannot be attended. It is being used as a means of distributing large amounts of

69. Burton, Paul F. *op.cit.*

70. New Encyclopaedia Britannica. *op.cit.* p.3:501.

information in a compact form. These small disks⁽⁷¹⁾ these can store up to 600 megabytes of information (or, 200,000 pages of text), CD-ROM is useful medium for database publishing. The capability of the disks vary depending on type and form, but a typical disk can store about 250,000 book pages. In another form (as a videodisk) it is ideal for pictures and graphics. A typical CD-ROM can store about 300,000 book pages.⁽⁷²⁾ The collection of the Library of Congress Printing and Photographic Reading Room are on videodisks, each of which holds about 54,000 separate picture.⁽⁷³⁾

The databases on the CD-ROM disks produced in 1985 cover many topics. The following databases are now available on CD-ROM format:

1. AGRICOLA (Bibliography of Agriculture)
2. Dissertation Abstract International
3. ERIC Resources in Education
4. MEDLARS
5. NTIS Government Reports and Announcements Index
6. Oxford Compendium on CD-ROM
7. POPINDEX
8. SCISEARCH Science Citation Index
9. West's CD-ROM Libraries, etc.

CD-ROMs are being configured as system file servers, partially replacing costly magnetic storage methods. Earth View Inc. (USA) has also demonstrated a compact video disk which combines text, images, sound and computer data.

Figure-1: projects the types information that can be stored on CD-ROM disk.⁽⁷⁴⁾

71. Convey, John. Online information retrieval. 3rd edn. London: Clive Bingley, 1989. p.89. *See also:* Paul F. Burton. p.38-41.

72. Riaz, Muhammad.. Library Automation. New Delhi: Atlantic Publishers, 1992. p.59.

73. Katz, WA. Introduction to reference work. 5th edn. New York: McGraw-Hill, 1987.

74. Riaz, Muhammad. *op.cit.* p.116.

Most currently available videodisk storage system can only be used read stored data and write new data is not possible as the previously written data can not be erased. However much research is being directed towards the development of erasable disks. Before long the following CD/S will available WORM (Write Once Read Many), DRAW (Direct Read After Write), CD-PROM (Programmable), and CD-I (CD Interactive) which can handle music, speeches, still pictures, graphics, computer programmes and computer data. Because of compact size and Read-Only-Nature, video disks are also known as CD-ROM storage-device⁽⁷⁵⁾ CD-I is also similar to CD-ROM, but has the advantage of storing not only text, but video and audio as well on a single medium. As the video disk technology becomes less expensive and more versatile, it may soon become a part of a computer system like magnetic disk.

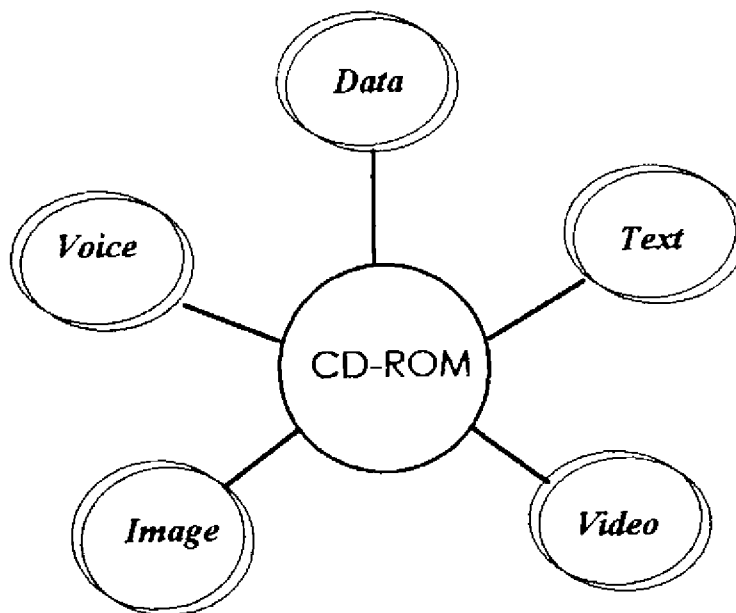


Fig:1. Types of information that can be included on a CO-ROM disk

75. Nair, R. Raman. Computer application to library and information services. New Delhi: Ess Ess Publications, 1992. p.32.

Computer storage is becoming smaller, cheaper and faster day by day. A laser Encoded Disk is already available that can store the words contained in two hundred thousand books; which means the entire books of a library. We can refer any piece of information in a second and get a hard copy that is a printed copy of it just by pressing a button. The massive capacity of these devices will allow the storage of sound and colour motion pictures for instant retrieval. Whole ENCYCLOPAEDIA OF BRITANNICA is now available on a CD. In future, will have very small, very efficient storage devices, where the access of information will be possible in nano seconds. In future we may also expect to get books published on the laser disk, like long play records or compact disk for music.

6. COMMUNICATION TECHNOLOGY

Access, communication and transmission of information are the key elements of information dissemination. The developments in communication technology has made it possible now to transmit information from one corner of the earth to other at the speed of the light. A number of communication networks that extend to all parts of the world have come into existence. Radio, television and the telecommunication networks allow millions of people to keep in touch with each other even though they are geographically dispersed over distances of thousands of kilometres. Recently developments in technology have resulted in vast communication networks and world-wide flooding of data communications. Data communications is simply the collection and distribution of data in digital form electronically from one location to another. Data are transmitted from computers to terminals and even to other computers. Use of data communication in computer and data processing systems is growing rapidly in the field of human knowledge and all spheres of Research and Development (R&D) in scio-scientific and technological aspects.

6.1. TELEPHONE

Alexander Graham Bell invented the telephone in 1876. The first telephone exchange was set-up at Connecticut in 1878, which heralded a new era in communications. The telephone came to India very shortly just after the invention in Bombay, Calcutta and Madras.⁽⁷⁵⁾ The telephone came to Bangladesh in the then East Pakistan in the very beginning of this century. The telecommunication facilities in Bangladesh are not yet adequate in terms of requirements, technology, and the level of services to stimulate and sustain economic growth. The telephone density in this country⁽⁷⁶⁾ is only about 0.21 per 100 population in 1989/90 compared to 0.36 in India, 0.48 in Pakistan (1984). As per World Bank reports the density is only about 3 per thousand population in 1995 as compared to 16 in Pakistan, 11 in India and 10 in Sri Lanka.⁽⁷⁷⁾

In the earlier days there were magnetic telephones. When any one wanted to call the telephone operator, they had to rotate the generator handle. Next, there were manual exchanges which were run on batteries. Each unit had to have a dry cell in order to work. Then came the central battery exchanges. Today, excepting a few, all cities and towns have automatic exchanges. In 1973-74, there were 60,000 telephones operating in the country (6,000 in rural areas and 54,000 in urban areas). The number of telephones increased to 1,20,000 in 1979-80 (10,600 rural and 1,09,400 in urban) and to 1,82,000 in 1984-85 (26,600 in rural and 1,55,400 in urban). During 1980-85, 39 (thirty-nine) manual exchanges were replaced by automatic exchanges in district towns. During the same period the number of automatic exchanges increased 45 to 84.

75. Kumar, PSG. Computerization in Indian libraries. Delhi: BR Publishing, 1987. p.37.

76. Ministry of Planning. The fourth five year plan: 1990-95. Dhaka: Ministry of Planning, 1990. p.VIII-36.

77. World Bank. World Bank report 1996.

On the other hand, 144 (One hundred and forty-four) manual exchanges and 20 (Twenty) auto-exchanges were installed in Upazila towns. One hundred Union Councils and rural growth centres were concentrated by Public Cell Offices during the Second Five Year Plan period (1985-90).⁽⁷⁸⁾ In order to facilitate international communication, Digital Trunk Exchanges were set up at Dhaka, Chittagong, Khulna, and Sylhet. The setting up of an 'A' grade Satellite Earth Station at Betbunia in 1975 to improve the overseas communication was a notable development. A type -'B'Satellite Earth Station was also established in 1981 at Talibabad to meet the increased international telecommunication demands.⁽⁷⁹⁾

With a history spanning over a century, the telephone is one of the longest established methods of electronic information transfer. Apart from the invention on the concept itself, there was only one truly significant advance: the development of telephone networks based on exchanges.⁽⁸⁰⁾ Previously, telephone communication between two people could take place only through a special cable link from instrument to instrument. It was several years before-the-step away from that when it was made, despite existing experience with somewhat similar telegraph system.⁽⁸¹⁾

The inquiry for information may come by phone and it is best to furnish the information immediately. More often this service is provided by consulting quick reference tools. Telephone calls can often be a strong means of disseminating information and keeping of what is being happened in the

78. Ministry of Planning. *op.cit.*

79. *Ibid.*

80. Note: Exchanges are the switching centres.

81. Deeson, Eric. *Managing with information technology*. London: Kogan Page, 1987. p.126.

concerned organisation and out side as well. But personal telephonic notification about new acquisitions can not be used extensively because these are too much time consuming. Only in small organisations can follow this purpose with any degree of efficiency.

6.2. *TELEX*

The telex systems were first initiated in Germany and several other European countries during the early 1930s.⁽⁸²⁾ By the end of the decades telex had developed into an international service. In 1962 Western Union established its Telex system in the United States. Eight years later it acquired the Teletypewriter Exchange Service (TWX), A telegraph exchange system that had been developed by the American Telephone and Telegraph Company in 1931.

The teleprinter has been in use for many years and at least one of its uses in the form of the telegram was familiar to most people in several countries before its relatively recent demise.⁽⁸³⁾ A telex machine looks like a typewriter with keyboard and printer, but it is also linked to the telephone network. As a result, the message created on the machine is sent via the network to its destination where similar machine operates as a receiver and print out the message. All telex machines can be used in this way both to send and receive messages. However, telex is an automatic dial-up teletypewriter switching service provided by common carriers. A teletypewriter device is capable of transmitting and receiving alphanumeric information communication channels; a printer is used for displaying information received from a telegraph system.⁽⁸⁴⁾

82. New Encyclopaedia Britannica. *op.cit.* p.11:617.

83. Hinton, Robert. Information technology and how to use it. Cambridge: ICOSA Publishing, 1988. p.16.

84. Longley, Dennis and Shain, M. *op.cit.* p.334.

Telex grew out of the telegraph system and the original telegraph owed its importance to the need for sending messages associated with growing network of railways in the 19th century.⁽⁸⁵⁾ Later, telex teleprinters employ the Baudot code and send messages at about 67 words per minute, whereas TWX terminals utilise the American Standard Code for information Interchange (ASCII) and transmit at speeds of up to 150 words per minute. The processing computers that connect the two systems, nonetheless, enable their subscribers to exchange messages on a delayed basis by making suitable code and speed conversions.⁽⁸⁶⁾ Telex has long had a role in academic library in providing rapid communication between researchers and in speeding loan requests.⁽⁸⁷⁾ The need to send message speedily and accurately, telex systems are widely used in the library.

6.3. *TELETEX*

Teletex developed as a means of using existing equipment, that is to say, telephones, computers, microcomputers, and television receivers, for additional information purposes. Teletex is a one-way service to a large number of simultaneous users, where pages of information from a central database are broadcast as part of the regular television signal. Information can only be viewed, but users cannot send any commands or information back to the service provider. Teletext is most suitable for conveying information that is topical, transient and of broad general interest.

Meanwhile telex faces more and more competition from alternative systems of electronics information transfer. That competition is not just a threat, it is a spur to telex to come up to date more quickly. Already modern telex terminals look

85. Deeson, Eric. *op.cit.* p.130.

86. New Encyclopaedia Britannica. *op.cit.*

87. Teague, S. John. Microform, video and electronic media librarianship. London: Butterworths, 1985. p.108.

to the user much like word processors connected to a special communication link. Anyone can now prepare material- off-line, editing as much as desired, and recording the messages in a backing store for later despatch. One can give each message a priority rating, to determine its place in the queue when transmission starts; it is even possible to record the time it should be sent.

During the off-line message entry process, it is possible that an incoming message will arrive. This should not interrupt the current task; rather, the modern terminal will let the telex received be printed out and/or stored on the disc while the user gets on with the typing. Telex can nowadays even be used in 'chat mode', when the line between the two terminals stays open, so that messages can pass to and from in turn. The advantage of this is the paper record of the whole 'conversation' that both parties end up with telex machines print out both outgoing and incoming text.

However, for almost a decade from now, teletex has been in the offing as a viable and much better alternative to telex. Teletex has undoubted advantages, yet it still remains only in the offing in most countries. Teletex is an international standard for information transfer between electronic equipment using the telephone network. There is no more need for special terminals, as any computer or word processor can use the system if its communication software is teletex-compatible.

The information carried is both text and graphics. The slow take-up of these facilities has led to the promotion of them in libraries and they have become a standard part of library provision. Up to the minute information is an area of obvious need that these systems meet in libraries. Teletex is an enhanced telex system. A teletex terminal is a device similar to a word processor with a keyboard, screen, printer and internal storage. Some word processors, such as

IBM's Display Writer, are capable of receiving and transmitting teletex data. Project Hermens established in 1984 is a teletex-based document-delivery service which incorporates: document ordering, automatic document delivery, regular delivery of pre-specified documents, electronic-mail, transfer of documents between participants.

6.4. *FACSIMILE (FAX)*

The basic principles of facsimile transmission were outlined by Alexander Bain, a Scottish clock-maker and inventor, in a British Patent in 1843.⁽⁸⁸⁾ Many different design equipment designs have been proposed over the years, but particularly all are based on the scanning of the original copy, one elemental area at a time, and representing the shade or tone of each area by a specified amount of electric current. Started in 1948, facsimile transmission is widely used in the libraries of USA and elsewhere. This is a system for transmitting visual images by scanning them at a transmitting station, sending them over a communication channel, and reconstructing them at a receiving station. "As a technology, facsimile transmission is more-than-a-century old. Its main use before the Second World War was for the transmission of photographs for newspapers."⁽⁸⁹⁾ But Roger K. Summit, Director of Lockheed Information Service, believes that in the long-term "broad and facsimile transmission systems scheduled for the next few years will eliminate the physical constraints and time delays..."⁽⁹⁰⁾ On the other hand, the European Economic Commission is actively perusing the use of facsimile transmission (Fax) as the basis for a full document delivering service of scientific and technical articles⁽⁹¹⁾ in libraries

88. New Encyclopaedia Britannica. *op.cit.* p.4:651.

99. Thompson, James. The end of libraries. London: Clive Bingley, 1982.p.58.

90. Outlook on research libraries. 1980 Feb; 2(2):14. In: Thompson, James. The end of libraries. *op.cit.*

91. Thompson, James. *op.cit.*

and information services. An important technology to libraries and information services is facsimile transmission. This is a system for transmission of visual images by scanning them at a transmitting station sending them over a communication channel, and reconstructing them at a receiving station.⁽⁹²⁾

Facsimile transfer, called fax in short, is another fairly old technology that is now expanding fast in the general office market⁽⁹³⁾ as well as in the library and information services. Like telex and teletex, this kind of information transfer requires special equipment connected permanently to a switched communication line. Unlike telex, however, the standard telephone circuits are used, thus adding flexibility, increasing the potential user base, and cutting running costs.⁽⁹⁴⁾

There are both analogue and digital facsimile machines, and facsimile can be sent via cable, telephone lines, microwave, and other means. Usually, these are sent over telephone lines because that is much more economical. It can take from a few seconds to a few a minutes per page to deliver facsimile documents anywhere. With the telephone system being virtually universal throughout the world, it is perfectly possible to transmit an A4 size page to another terminal anywhere else in the world in less than one minute.⁽⁹⁵⁾

Facsimile transmission has many different application. Libraries, for example, employ the process to reproduce of pages from any book, on demand, through photocopying as a signal over regular telephone lines or via microwave relay station to a clientele. Newspaper publishers rely on facsimile transmission to secure nearly all photographs of events outside their respective communities. Facsimile transmission usually are being sent over telephone lines, as there are

92. Rice, James. *op.cit.* p.29.

93. Deeson, Eric. *op.cit.* p.134.

94. *Ibid.*

95. Hinton, Robert. *op.cit.* p.22.

other channels, such as cable, microwave, and other means both digital and analogs, because it is economical. It takes from a few seconds to a few minutes per page to deliver facsimile documents. David Haron has emphasised that the telefacsimile should be preferred due to its being faster, less expensive to operate rather than teletypewriter manual system. Such a system will provide a copy of a page of text or graphics at a remote location using terrestrial or satellite links. There is another type of facsimile, that is Microfacsimile, it refers to the transmission of images on microforms to remotely located places electronically, where these may be received in the form of displays on screen, printed on paper or even in microforms. Thus it links two technologies i.e. facsimile transmission and micrographics to provide one of the useful information transmission systems.⁽⁹⁶⁾

6.5. VIDEOTEX

Videotext developed as a means of using existing equipment, that is to say, telephones, computers, microcomputers and television receivers, for additional information purposes. The information carried is both text and graphics.⁽⁹⁷⁾ But the term videotex was originally suggested by the Comite Consultatif International Telegraphique et Telephonique (CCITT) which is part of the International Telecommunications Union (ITU) responsible for standardisation and tariff structures in telephony, telegraphy and data transmission. Videotex is used for a whole class of electronic systems which use a modified television set or a VDU to present computer-based information in a user-accessible visual form. As stated, videotex systems which use telephone lines, or other channels of communications that provide a two-way link, are known as interactive videotex or viewdata systems, whereas videotex systems in which information is broadcast to the terminals, are known as broadcast videotex systems.

96. Riaz, Muhammad. *op.cit.* p.172.

97. Teague, S. John. *op.cit.* p.107.

In videotext technology a number of innovative approaches involving various combination of transmission technologies like telephone cable, TV cable, satellite, optical fibres have been recommended for videotext delivery. Personal computers may become one kind of home terminal device used to approach videotext system. The users could store and interact with the information inexpensively through their home computer. They could get hard copy using home facsimile or printing device.

Videotex is also used generally to cover teletex, a broadcast videotex service as well as viewdata, a wired videotex service. It is this latter meaning that is considered here. Videotex technology is designed to forge a link between members of the general public and a centralised computer. In its most advanced form, it can bring massive reference library, computer power and extensive communication facilities into the home. It has the capability to act as the single most important step in the evolution of the information society.⁽⁹⁸⁾ Videotex is an interactive (two-way) user-friendly, computer-based service, mainly aimed at the home consumer market. It is a service in which users can access large public database from their home, using dial-up modem through the telephone network. A special videotex terminal (or special software for a PC) is required to access videotex. It has been very successful in France, under the name Minitel.

The capability of encoding text or even graphics of various kinds into a computer memory and then retrieving it over a communications network is the basis for services now popularly known under such labels as "videotex" or "teletex". Generally, videotex is an information system that is distributed from a computer via telephone network. A specially-equipped television set receives the textual information and stores it in an electronic memory. Then, at one's command,

98. Longley, Dennis and Shain, M. *op.cit.* p.360.

page of information can be displayed on the television screen. In a teletex system, text may be received via this television set along with television roadcasting. Computer-based textual communicate systems are also the basis for Electronic Mail.⁽⁹⁹⁾ Videotex service typically provides the following types of services:

Information Retrieval Services: Examples are weather forecast, stock exchange results, national and international news, and on-line retrieval published magazines and newspapers (electronic publishing).

E-Mail Services: Videotex service may be connected to a mail network.

Electronic Shopping Services (Teleshopping): Users can view a catalogue of any products and pay for them, using credit/smart card through the videotex system. Teleshopping eliminates time lost for travel and provides improved inventory control.

Electronic Banking Service (Telebanking): users can perform simple transactions, like transferring money and making payments. Financial and economic data can also be monitored using the videotex service.

Education Services: It is one of the aims of videotex to provide home users a wide range of services such as education and games.

6.6. ELECTRONIC MAIL (E. MAIL)

Electronic-mail is, therefore, abbreviated to E-mail, also known as a Computer-based Messaging System (CBMS), belongs to the category of Computer Mediated Communication Services. It is a data communication service that uses computers and telecommunication lines to store and send messages that would otherwise take the form of a telephone call, a telex message or a postal letter.

99. Williams, F. *op.cit.* p.171.

The world web of E-mail is growing which is blind of race, gender, age, or handicap. It works as a new technology and a service of information on fun, in leisure-time and personalised to specialised new in services and what not for everyone. E-mail services help transfer files on whatever it may be, log-into host computer/super computer from remote end for information retrieval. This service is faster, reliable, for transmission of interpersonal information. E-mail today has, in fact, become part of work-culture.

The term *electronic-mail* includes teletex as a way of allowing information transfer between computers.⁽¹⁰⁰⁾ When point-to-point messages are sent over electronic communications systems such as a computer network or by facsimile machines, the messages are called electronic mail.⁽¹⁰¹⁾ E-mail evolved in the mid 1960s amongst various computer time-sharing system. In the late 1960s cooperative engineering research organisations begun communicating with one another and universities over the Arpanet (Advanced Research Projects Agency Networks), USA. They started shipping computer data electronically amongst themselves and launched computer programmes through remote sensing. By the mid-1970s, it was already being viewed as a powerful tool. In 1980s, a computer language for Artificial Intelligence⁽¹⁰²⁾ was collaborating over the Arpanet. Most have never met or rarely phoned each other in three years' time. Computer networks make it possible for us to send message or information to each other. Each teacher, student or researcher in a library or university having a computer network can be assigned an Electronic Mail Box, in which messages are received and stored on the secondary storage. To open and read an

100. Deeson, E. *op.cit.* p.146.

101. Williams, F. *op.cit.* p.234.

102. Marsterson, William. Information technology and the role of the librarian. London: Cromhelm, 1986. P.37. *See also*: Nasreen Chowdhury. Electronic mail: still nascent in Bangladesh. The Bangladesh Observer, 1994 Feb 3:10

e-mail, one will have to go to the nearest terminal and log-on. When Logged-on, the Visual display Unit (VDU) terminal will request, if one have mail, to check his/her mail.

A head of a library system can inform different branch libraries about the new arrival of a new information source or some important official assignment through an E-mail and avoid the time consuming process of telephonic individual branch librarians, who may be busy or not available at the time of telephone call. In E-mailing system, the information to be communicated would be originated at the central library, from where the system is operated. It would then be routed to the E-mail boxes of all branches by simply keying in simple command. Each branch librarian can open the mail by displaying the Computer message on his VDU terminal. He can take prompt action.

6.7. COMPUTER CONFERENCING

Computer networks can be utilised to hold computer based conference. It requires the use of a link, joining distant computers and terminals so that the users can exchange information and messages directly and immediately i.e. in fact to have a meeting. A computer conference can be seen as something halfway between a conventional conference and a rapidly published newsletters. The system can be used by hundreds of people at diverse geographical locations. Each participants must have an access to a computer terminal connected to the conference work. One can sit at the terminal at a convenient time during the day call up any message and respond to them. The system has database containing a large number of text messages. The computer maintains a permanent history of all conference discussion. It remembers which message each user has already seen. When terminal is switched on by a user, it displays all the entries which have not been seen. The user can directly write his own comments and messages

which will be stored in the conference database. Thus computer conference may be an economic, less time consuming convenient alternative to certain discussions, seminars, and so many things.

6.8. *TELECONFERENCING*

Teleconferencing is a sort of network capability that uses the telephone as a medium for voice transmission, the television for radio, and the computer for data transmission services. Data terminals are connected together via the telephone network. Three or more persons working on the same project can communicate with one another through terminals. One participant sends a message to many others for comments. Individual responses are appended to the original message and can be reviewed by other participants. These in turn may provoke responses which are themselves made available for review and comment. The result is recorded dialogue which can be reviewed by all the authorised persons. Thus teleconferencing using audio and video-equipment, as indicated above, requires all the participants to be on-line at the same time. The device computerised teleconferencing permits the participants to attend meetings at their convenience. This possible because of the conference dialogue can be stored in computers.

The conferencing removes barriers of time and geography and allows individuals to participate at their own pace. Donald D. Spencer Reports that more than 20 million business meetings are held everyday in the US. These firms which are equipped with proper teleconferencing equipment save travel time and money enormously.

7. MICROGRAPHICS

The impact of new technology on library and information services management started with the revolutionary developments in micrography⁽¹⁰³⁾ The science upon which photograph is based was initiated by a discovery of 1556, namely, that chloride of silver darkened when exposed to sunlight. The technique of photography, that is the ability to reproduce desired images upon prepared surfaces by the influence of light, may be said to have had its origins in 1816 when Niepce, later the partner of Daguerre, successfully made the first daguerreotype prints. A daguerrotype is direct positive photographic image and is named after L.J.M. Daguerre who published such photographs in Paris in 1839. Fox Talbot announced his calotype process in 1839 and his used paper negatives sensitised by a silver solution to make prints. In the same year Sir John Herschel is said to have made first use of the word photograph.⁽¹⁰⁴⁾

In 1839, the Manchester optician and photographer John Benjamin Dancer produced the first microphotographs on daguerreotype plates. He was unable to find a really suitable means of production of microportraits until his successful experiments with James Scott Archer's wet collodion process, details of which Archer published in 1852; the same year Dancer made use of it. Dancer's achievement was to produce the successful microphotographs on relatively grainless emulsion in 1853. He produced a photograph of the text of the Ten Commandments the size of the pin-head (1243 letters). It was mounted on a slide and read with the aid of a microscope.⁽¹⁰⁵⁾

The best coating for photographic glass plates was then still a matter for experiment. At first albumen was used and in 1848, collodion; gelatine was not

103. Kumar, PSG. Computerization of Indian libraries. Delhi: BR Publishing. 1987. p.16.

104. Teague, S. John. *op.cit.* p.4.

105. *Ibid.* p.5.

used until 1871. Following an analysis by infra-red spectroscopy of two Benjamin Dancer slides supplied by L.L. Ardern, it was possible for G. Newman and G.W.W. Stevens to assert: "... there is no doubt that the vehicle of both these slides is collodion."⁽¹⁰⁶⁾ Dancer also reduced all 650 pages of Queckett's Treatise on the Microscope to one microform of 3/8 inch x 3/8 inch (10 mm x 10 mm). Dancer used the term 'Microscopic photographs'- the word 'microphotograph' was probably first used by George Shadbolt in 1854.⁽¹⁰⁷⁾ It is of interest to note that, "in 1963, the Library Association and the Manchester Photographic Society were jointly responsible for the erection of a commemorative plaque on the site of Dancer's Manchester premises which he occupied during the period 1841-1880. Dancer probably did not invent any new photographic process but devised new applications of known techniques; particularly those of *Daguerre* and *Fox Talbot*".⁽¹⁰⁸⁾

Microphotography was used in espionage activities during the first world war. The 1924 Leica camera was a development that foreshadowed the planetary camera now used in documentary microfilming. In 1926 George McCarthy showed an American bankers convention his Checkograph device. This led, in 1928, to the Eastman Kodak Company's introduction of its microfilming in banking system whereby cheques were microphotographed to assist in preventing fraud. This system used a camera that was developed into the Recordak continuous camera and from this have stemmed many modern

106. Newman, G and Stevens GWW. Analytical identification of process used for Dancer microphotographs. *Microdoc*, 1978; 17: 26-34.

107. Milligan, H. New light on JB Dancer, separate reprint IPP in mem. Proc. Manch. Lit. Phil. Soc., 1972-73; 115. In Kawatra, PS. Fundamental of documentation. New Delhi: Sterling Publishers, 1983. p.103.

108. Milligan, H. New light on J.B. Dancer, separate reprint: pp.9. memo. proc. Manch. Lit Phil. Soc., 1972-73; 115. In: Teague, S John. *op.cit.*

microfilm developments. In 1927 the Library of Congress initiated project A which involved the copying of materials relating to American history in the archives and libraries of Great Britain, France, Spain and Germany, but hand copying and typing were the method until the adoption, in Paris, in 1928 of the Paul Lemare camera and enlarging apparatus. Yale University experimented with the use of film for the reproduction of library materials from 1931 and the New York Public Library three or four years later. Other learned libraries were making use of photography from the early 1930s.

In photography and data processing, the condensing, storing and retrieving of graphic information micrographics are used. Micrographics involve the use of all types of microforms⁽¹⁰⁹⁾ and microimages.⁽¹¹⁰⁾ A microfilm roll that contains microimages arranged sequentially, is generally used in data processing and for documentation and record compilation⁽¹¹¹⁾ in library and information services. Libraries started microfilming in 1930 to film rare books and other deteriorating materials. With increase in the volume of literature that is being published and the fast growing collections in libraries, the microfilming technique was adopted as a storing device to economise the space in the libraries. With the increase in the cost of production and transportation, microforms gained importance as one of the physical forms of the documents.⁽¹¹²⁾ "A microfilm contains photographic image on a reduced scale, of information that might otherwise be represented in printed form. Generally, it appears as a continuous roll containing several thousand frames. The *16 mm cine* format or *16 mm comic* format a roll of microform generally contains several thousand frames, each of which may hold the equivalent of one printed page."⁽¹¹³⁾

109. A medium that contains microimages, such as microfiche and microfilm.

110. An image too small to be read without some form of magnification.

111. Kumar, PSG. *op.cit.* p.18.

112. Spencer, DD. *op.cit.* p.228.

113. Sanders, Donald H. *op.cit.* p.26.

Microfiche is a microform storage medium in which many microimages are arranged in a grid pattern on a sheet of film, usually containing a little that can be read without magnification. A microfiche is 105 mm x 148 mm or 10.16 cm x 15.24 cm strip of microfilm that contains the equivalent of 270 pages of printed matter.⁽¹¹⁴⁾ and generally have 98 frames. Today there are devices where by we can accommodate as many as 13,000 pages on a single microfiche.⁽¹¹⁵⁾ Microfiche was invented by Dr. J. Goebel, a German who developed a system using a transparent medium instead of an opaque card⁽¹¹⁶⁾ for miniaturisation. Around 1950-51, Dr. Van der Wolk introduced microfiche to the Delft students. Among the students he taught was Mr. L. de Mink who was studying electronics and electrical engineering. He immediately recognised the vast potentiality of this medium. A few years later, after having done some microfilming for local projects in Sweden, he devoted all his time to the venture of a microfilm-microfiche company. And thus in 1957, Inter Documentation Company came into being.⁽¹¹⁷⁾

Micrographics offer the significant advantages of high document capacity combined with space conservation. As the volume of archival data increased, there was a need to be able to store large quantities at very reasonable costs. Optical methods with the possibilities of high reduction ratios or microimages met this need. However, the success of many micrographic application depends on the ability to rapidly locate one or more specified microimages from among thousands, or in some cases millions. Micrographics have been heavily utilised since the late 1950s.

114. Spencer, DD. *op.cit.*

115. Kumar, PSG. *Op.cit.* See also Marsterson, William. *op.cit.* p.134-5.

116. Fiche is a French word meaning *Card*, and is pronounced *Mi-kro-fish* as in fiche or cut byte.

117. Kawatra, PS. *op.cit.* p.104.

7. BROADCASTING MEDIA

Broadcasting is the transmission of radio and television programmes that are intended for general public reception, as distinguished from private signals that are directed to specific receivers. In its most common form, broadcasting may be described as the systematic dissemination of entertainment, information educational programme, and other features for simultaneous reception by a scattered audience with appropriate receiving apparatus. Broadcasts may be audible only, as in radio, or visual or a combination of both, as in television. "Sound broadcasting in this sense may be said to have started about in 1920, while television broadcasting began in the 1930s. With advent of the cable television in the early 1950s and the use of satellites for broadcasting beginning in the early 1960s, television reception improved and the number of programmes receivable increased dramatically."⁽¹¹⁸⁾

Broadcasting⁽¹¹⁹⁾ makes possible long distance information transmission between sources and receivers without the benefit of transportation or a direct physical linkage. "Just as the challenge in wire was to develop devices for encoding and decoding message patterns imposed upon the flow of electrical current, the challenge in broadcasting was to do the same with electromagnetic waves."⁽¹²⁰⁾ After Guglielmo Marconi's pioneering wireless broadcast of Morse code across the Atlantic Ocean in 1901, experiments in practical radio communication were vigorously pursued on both sides of the Atlantic. Radiobroadcasting was first undertaken in the United States by amateur enthusiasts, one of whom aired the first known programme on Christmas Eve of 1906. Radio broadcasting, which was soon to become the most popular form of

118. New Encyclopaedia Britannica. *op.cit.* p.15:210.

mass entertainment ever created, was inaugurated with a simple, unpublicized programme on Christmas Eve 1906. His first broadcast was heard by a small and unsuspected audience of shipboard wireless operations off the New England Coast.

The voice that made history that night belonged to Canadian-born Reginald A. Fessenden, an inventor who had long dreamed of broadcasting the human voice. Fessenden, who had worked at the Edison Laboratory in New Jersey and had taught electrical engineering at several universities, had first conceived a voice radio in 1900, while conducting wireless experiments for the US Weather Bureau. During the four years that took Fessenden to perfect such a system, another radio genius was working along similar lines. "The man, Lee De Forest, an eccentric American Physicist, patented invention of a radio tube sophisticated enough to permit voice broadcasting in 1907."⁽¹²¹⁾

However, the foundations of that empire had been laid only a decade earlier by a brilliant 24-year old Italian named Guglielmo Marconi. His invention of the wireless in 1896, and his transmission of a radio signal across the Atlantic in 1901, had been transformed into international communication device, providing for the first time a means of message transmission instantly between distant places⁽¹²²⁾ Radio was equally popular in other countries, and between 1920 and 1924, stations appeared in every major nation. By 1930, broadcasts were heard throughout the world. Britain's first radio programme was aired in 1919, and by 1921 there were stations in Canada, New Zealand, Australia,

119. i) In communications, the simultaneous transmission of interaction to a number of stations.

ii) In radio communications, the transmissions by means of radio waves, of programmes of sound and vision for general reception.

120. Williams, Frederick. *op.cit.* p.145. *See also:* Reader's Digest : great events of the 20th century. New York: Reader's Digest Association, 1977. p.44-7.

121. Reader's Digest great events of the 20th century. *op.cit.* p.45.

122. *Ibid.* *See also:* Williams, F. *op.cit.* p. 145-52.

and Denmark. A year later, France inaugurated regular broadcasts from the Eiffel Tower, and the first Soviet station opened in Moscow. By 1925, radio had spread to other European countries and to Mexico, Japan, India, and Bangladesh. "By the late 1920s, however, the television research in the United States was led by Radio Corporation of America (RCA), which had hired Zworykin⁽¹²³⁾ in 1929. RCA made the first experimental broadcast of an all-electronic video system in 1933, and in April 1939, RCA made its public debut at the New York World's Fair. Network television had begun.

The 1930s and '40s were the *golden age of radio*. As broadcasts learned how to utilise the medium, new types of drama, light entertainment, and documentary programming were developed ; traditional art forms were also transmitted with success.⁽¹²⁴⁾ On the other side of the Atlantic the British Broadcasting Company (BBC) had launched its first television service on November 2, 1936, with daily two-hour broadcasts. The BBC's first television was in 1936. In 1937, the BBC's coverage of king George VI's Coronation was seen by some 50,000 viewers, and by 1939, when the government suspended television broadcasting for the duration of the World War II, about 20,000 homes in Britain had TV sets.

Television did not come into its own until after the end of the war. In 1946, the BBC resumed regular programming and US Government lifted its ban on the manufacture of new sets. In the United States, between 1949 and 1951, the year

123. In the early 1920s, a Russian immigrant to the USA, Vladimir Zworykin, developed an electronic scanning system. In 1923 he filed a patent application for his Iconoscope, a television camera tube that became the basis of modern picture transmission. Inside the tube was a plate covered with focused on a scene. Dots formed by an electron beam became electrically charged in proportion to the intensity of the light striking them. An electron gun continuously scanned the plate, the passing over of each dot just long enough to pick up its charge. After this information, transmitted as an electrical code to a receiving set was decoded, another electron gun "painted" the picture on a phosphorescent viewing screen.

124. New Encyclopaedia Britannica. *op.cit.* p.2:536.

of the first coast-to-coast broadcast, the number of television sets jumped from 1 million to more than 10 million. By 1958, there were 523 stations and nearly 47 million home sets.

In the 1950s, the first local non-commercial, or educational stations began to operate in the USA. In 1967, Congress established the corporation for Public Broadcasting to oversee their activities. World-wide, the growth of regular television broadcasting was slower than in the US and Britain, not beginning in most countries until the 1950s. In Latin America the new industry developed in the US pattern, but European television, on the other hand, followed the British model. Television in Japan, New Zealand, Australia, and Canada, developed along similar lines. Colour television was developed in 1940 with a broadcast service starting in 1967. Black and white video tape recording was demonstrated in 1951, colour in 1957 and disk recorder in 1968. Philips announced a Laservision video disk system in 1978 and this was commercially sold from 1982.⁽¹²⁵⁾

In 1965, the television system was introduced in Bangladesh and since then sub-stations have been set up in Chittagong, Sylhet, Khulna, Rangpur, Mymensingh, Natore, Noakhali, etc. The colour television system was introduced on 1st December 1980.⁽¹²⁶⁾ Television broadcasting in the Soviet Union, Poland, Czechoslovakia, Romania, Bulgaria, Yugoslavia, Hungary, India, Pakistan and in Bangladesh, is controlled and financed by the state. The same is true in many African and Asian nations.

125. Teague, S John. *op.cit.*

126. Bangladesh Bureau of Statistics. Statistical yearbook of Bangladesh: 1993. 14th edn. Dhaka: BBS, 1994. p.6.

To Marshal McLuhan, the oracle of the modern communication media, the television screen has become an extension of the viewer, putting him, since satellite transmissions began in 1962, in immediate and intimate touch with events all over the earth. "Ours is a brand-new all at oneness", writes McLuhan. *Time* has ceased, *space* has vanished. We now live in a global village ... a simultaneous happening."

Television has invaded many more areas of our world, from spy-in-the-sky TV satellites to computer monitors and street-corner cameras that serve as electronic policemen; from cameras lodged in the noses of bombs to direct them to their targets to the wall-sized viewing screens, video cassettes, and three-dimensional pictures. Whether we like it or not, tiny screen that first began to glow for the American Public at the World's Fair in 1939 is directly providing much of the light by which we lead our life.⁽¹²⁷⁾

8. CABLE DISTRIBUTION

A system for distribution of a number of television and sound channels over a cable-connected network to a number of receiving points⁽¹²⁸⁾ has started in the early 1950s. Cable, in electronics, is a flexible electric wire sheathed in insulation. Such systems originated in the United States and were designed to improve reception commercial network broadcasts in remote and hilly areas.⁽¹²⁹⁾ During the 1960s these were introduced in many large metropolitan areas where local television reception is degraded by the reflection of signals from tall buildings. Commonly known as community antenna television

127. *Ibid.* p.281.

128. Roberts, R.S. Dictionary of audio, radio and video. London: Butterworth, 1981. p.33.

129. New Encyclopaedia Britannica. *op.cit.* p.3:705.

(CATV), these cable systems use a "Community antenna" to receive broadcast signals, which they then retransmit via coaxial cables to homes and establishments in the local area subscribing to the service.

Since 1959, when cable television system was, also called cablevision, freed to out in Toronto, these have many schemes to supply areas where normal transmission are difficult to receive. These are not so necessary in the UK, but nevertheless are about to be further promoted and channels will include some for educational and library materials. Cable television was originally developed as a relay or classic cable service to provide high quality reception to homes which found it difficult to obtain a good picture from domestic antennae. This system involved the sifting of a main antennae at a strategic, normally elevated site and transmission of the received signal into homes via cable.⁽¹³⁰⁾

However, the cable of cable TV is not a new technology at all. It is simply a wire system that is capable of transmitting a variety of different programme signals simultaneously (the transmission space or bandwidth of one television channel is a thousand times greater than that needed for one telephone circuit). In essence, a cable system is a wired communication system of high capacity that flows from a central source (head end) via a major distribution cable (trunk) to neighborhood lines (feeders) and eventually to line into the house (drop). A TV cable is designed to augment or to substitute over-the-air distribution of television signals. Cable television is a service that sets up a master antennae and distributes television signals from it by means of a wire to subscribers in a licensed geographical area.

Televised information is available only via cable television. It is in this restricted access area that the library may become involved. The potential

130. Longley, D and Shain, M. *op.cit.* p.42.

impact of cable television on the library is tremendous; it could provide a whole new concept in information dissemination.⁽¹³¹⁾ Being a community service, it is entitled by law to transmit information via cable television. Direct broadcasting by satellite could be a beneficial result of the successful 1958 US Communications Satellite launch. By 1986 the BBC will have channels using this technology via a European satellite. Programmes could be beamed to satellite and back to dish aerial on the roof of an agency for cable transmission to subscribers' sets.⁽¹³²⁾ Since the CATV companies are required to make at least one channel available for public services, the library has an opportunity to interrelate with this new information service facility.

The potential applications to library and information services CATV are, therefore, vast. It is stated that CATV offer public libraries the opportunity to extend to of their traditional services - children work an adult education. Practically CATV takes the forms of a TV camera . Used in the library to transmit a picture of a page of a reference book, illustration or other materials over the cable network. Any uses who have telephones the library with an inquiry but has CATV facility can be shown material relating to their inquiry on their own television screen at home. Thus the marriage of libraries and television is an exciting and promising.

9. SATELLITE COMMUNICATION

The exchange of live television programme between nations and continents can easily be possible through satellite communication. International telephone and data services are provided through Earth station's located in more than 100 countries,⁽¹³³⁾ and a number of other satellite systems provide regional and

131. Cabeceiras, James. *The multimedia library*. 2nd edn. New York: Academic Press, 1982. .p.168.

132. Teague, S. John. *op.cit.* p.99.

133. New Encyclopaedia Britannica. *op.cit.* p.28:493.

domestic services, as well as communication with ships. The technique basically involves transmitting signals from an earth station to an orbiting satellite. The equipment aboard the satellite receives these signals, amplifies them, and transmits them to a region of the Earth. Any station with this region can pick up the signals, thus providing a communication link.

According to The New Encyclopedia Britannica, Rockets were first seriously considered as a means for sending humans through space by the Russian scientist Konstantin E. Tsiolkovsky and the US scientists Robert H. Goddard early in the 20th century. The use of unmanned space vehicles has been appreciated only since World War II, When German V-2 rockets were used in Air assaults in London. "In October 1942 the US science fiction writer George O. Smith published the story *QRM interplanetary* in the magazine Astounding Science-Fiction. Smiths' "Venus Equilateral" radio repeater, in a position equidistant from Venus and the Sun, was used to relay signals between Venus and the Earth".⁽¹³⁴⁾ In 1945 the British author scientist Arthur C. Clarke proposed that "the use of an Earth satellite for radio communication between, and radio broadcast to, points widely removed on the surface of the Earth. Clarke assumed a manned space station with living quarters for a crew, built of materials flown up by rockets".⁽¹³⁵⁾

Satellite is an earth orbiting radio relay station. A complete satellite communication system comprises the satellite and earth stations which communicate with one another via the satellite. "Satellites are used for receiving and transmitting communication signals for telephone, television and data channels".⁽¹³⁶⁾ "Satellites are, in fact, forms of microwave transmission in that

134. *Ibid.* p.28:494.

135. *Ibid.*

136. Longley, D and Shain, M. *op.cit.* p.98.

the satellites, which are positioned in space approximately 35200 km (22,000 mile) above the earth, represent relay stations for earth-bound communication links".⁽¹³⁷⁾ This type of microwave transmission is ideal for long-distance communications since the high altitude of the satellite avoids the interference caused by the earth's curvature and other geophysical obstructions such as mountains and atmospheric disturbances. Satellite transmission allows large amounts of data to be sent to long distances at rapid speeds. A number of communication satellites are now utilized in international as well as domestic communications.

"The first satellite communication experiment was the US Governments' Project Score (Signal Communication by Orbiting Relay Equipment), which launched a satellite on December 18, 1958. This satellite circled the Earth in an elliptical Orbit, with a 112-mile (180 km) perigee, its closest point to Earth, and an apogee, its greatest distance from Earth, of 926 miles (1,490 km) SCORE functioned for 13 days, until its batteries ran down. It reentered the atmosphere and was destroyed on January 21, 1959. A communication satellite is like a microwave dish in the sky. It receives signals, repowers them, then retransmit them to Earth".⁽¹³⁸⁾ Most satellites are capable of receiving and transmitting more than one signal at a time. However, one of the most desirable characteristics of satellite is that they do not involve extremely high cost that long- distance wired communication systems and even microwave systems do. This has made satellites a very inviting technology for developing countries that do not have the resources to become fully wired. As with other telecommunications methods, satellite distribution systems can carry sound, video, and data. These are several cable television systems in US that utilize satellite communications. It is may be said that 'satellites can provide instruct

communications between any points on Earth, well beyond the capabilities of land lines or microwave line-of-sight relay systems. The bandwidths available (the bandwidth is related to the amount of information per second which can be passed through communications channel) are far greater than any other available for inter-continental communication. Satellites provide accelerated information delivery at cost which are independent of the distance involved and at speeds ranging from 9600 bits per second to 256000 bits per seconds (BPS). A text page containing 20,000 bits would be transmitted in less than one-tenth of a second.'

"Chronologically speaking the first satellite "Sputnik" was launched by Soviet Union on 4th October 1957. The first commercial communication satellite was launched by USA in 1962. Since then a number of communication satellites have been launched by USA,, Japan, China and India. INTELSAT (International Communication Satellite Organization) comprises of 109 countries. Its latest generation in INTELSAT-V (two satellites) which can be hired on commercial basis.'⁽¹³⁹⁾ Other satellite systems include Canada's TELESAT system using ANIK satellites, Russia's STATIONAR, Indonesia's PALAPA, the French-German Symphonic, Italy's SIRIO. India is probably the seventh nation to have orbited an earth satellite with its own rocket. It orbited INSATLA in April 1982. In Pakistan SUPARCO has planned to orbit a domestic communication satellite (PAKSAT). It will also launch a low orbit scientific satellite 'Badr-A' which will perform four scientific experiments including digital communication. The Islamic Scientific and Cultural Organization (ISESCO) conceived as the virtual UNESCO of the Islamic World must help Islamic Countries in this venture".⁽¹⁴⁰⁾

137. Spencer, DD. *op.cit.* p.631.

138. Williams, F. *op.cit.* p.165.

139. Riaz, Muhammad. *op.cit.* p.177.

140. *Ibid.* p.177-8.

Satellite combined with other forms of telecommunications such as cable, and facsimile transmission are potentially useful in a wide variety of library applications. Among them are: 1. Remote browsing using slow-scan television. 2. Searching of automated catalogues. 3. Searching of bibliographic and numeric data bases. 4. SDI service. 5. Delivery of documents in real time via facsimile transmitters. 6. Distribution of cataloguing information, e.g. MARC records. 7. National or International-professional conferences without the need for participation to travel great distances. 8. Remote printing of books.

It is maintained that the satellites launched by the USA and the USSR etc. not going to occupy the entire equatorial orbit. There is plenty of room in the equatorial orbit for many more satellites without the danger of collision. It has been estimated that about 22300 satellites could be launched at 22300 miles above a fixed spot on earth. In USA many believe that eventually electronic information will replace the printed version. Delphic Study (US) was conducted posing queries to publishers, librarians and technologists. The following were among the specific forecasts made:

1. By the year 2000, 50 percent of existing indexing/abstracting services will be available only in electronic form.
2. Existing periodicals (in science and technology, social sciences, and the humanities) will not reach even the 25 percent level of conversion until after 2000.
3. By 1990, 25 percent existing reference books will only be available in electronic form. The 50 percent level of conversion will only occur after 2000.
4. By 1995, 50 percent of newly issued technical reports will only be available in electronic form.

F.O. Lancaster⁽¹⁴¹⁾ in a way, is a pioneer in the field of electronic publishing. In his latest work "Libraries and Librarians in an Age of Electronics" Lancaster

141. Lancaster, FW. Information retrieval systems. 2nd edn. New York: John Wiley, 1979.

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work should be done more rapidly and accurately by mechanical devices which can cope with the ever-increasing workload in every business and occupation in life.

The research activities and scientific advances that have been made during the last two or three decades in solid state physics led to revolutionary developments in electronics. These developments were supplemented by technological advances in computers, telecommunications, and as a whole in the information storage and communication technology. These technological developments also gave a new dimension to the concept of information systems. "The prototype and the early forms of the computer were meant to be an aid to human efforts and memory for calculating and accounting work. The calculating and adding machines were used for several thousand years. During the present century, technological innovations made the machine a multipurpose and complex instrument. The origin of this machine may be traced in Babylonia some 5000 years ago; the knotting strings of pre-Columbian tribes in South America; and the pebbles the ancient Romans called *Caecal*. Nonetheless, their essential purpose was the same. All were tools invited by man to help him complete the tedious work of adding up columns of numbers more quickly and accurately".⁽¹⁴⁶⁾

One of the earliest types of devices used for facilitating computations was the *Abacus*.⁽¹⁴⁷⁾ "The first mechanical computing device was used in the Middle East as early as 3000 BC".⁽¹⁴⁸⁾ "During the Greek and the Roman periods, the

146. *Ibid*.

147. Abacus is a counting apparatus. The word abacus is derived from the Greek word 'abakos', which means a board or calculating table. It consists of a row of parallel rods with beads are divided into two sections by means of a bar perpendicular to the rods. In one section there are four or five beads. Calculation is made by the bars and beads according to the significance of the bars and placement of beads. The abacus is still being used in some parts of the middle East and the Far East as well as in our country some times as a counting apparatus.

148. Teague, S. John. *op.cit.* p.97.

Abacus was used in the Mediterranean lands. This reckoning board was particularly an instrument of the merchants and trades men, and it would be applied universally, regardless of differences in languages and numbering systems. Four types of the devices were the Roman 'abacus', the Chinese 'swanpan', the Japanese 'soroban', and the Russian 'schoty'. Structurally, each consisted of balls in movable rows or beads on movable rods".⁽¹⁴⁹⁾

The Roman Abacus was a metal plate on which units, fives, tens, and so on were represented by balls that could be moved in grooves. "The Chinese Spawn had a horizontal bar across a frame separating five beads strung on the rod in the lower compartment and two beads in the upper compartment. Each of the upper beads represented a value five times as large as each of the lower beads. Whenever five units of the lower column were reached, they were replaced by one of the upper. All operations could be performed by sliding the beads up and down. The Japanese soroban was quite similar to the Chinese device, except that only one upper bead and four lower beads were strung on each rod".⁽¹⁵⁰⁾ The interesting is that we have come to about a well known book which was printed about four hundred years ago. "That book was first printed in 1503, and it has described regarding two types of style of computing at that time-the counters and the numerals. The number on the counting board at right is 1 241. The one at the left represents the attempted division of 1 234 by 97".⁽¹⁵¹⁾

"The seventeenth century brought a great step forward in computational work. The first significant step beyond such simple tallying devices was an ingenious device for multiplying, dividing, and extracting roots known as *Napier's*

149. *Ibid.* p.126.

150. *Ibid.* p.126.

151. *Ibid.*

bones⁽¹⁵²⁾, which was used for many years. In 1617, John Napier, a Scottish politician, magician, and nobleman, turned to mathematics for amusement and relaxation”.⁽¹⁵³⁾ “In 1614, Napier, inventor of Logarithms, had invented a mechanical multiplier along different lines”.⁽¹⁵⁴⁾ Napier's bone consisted of a packet-sized set of bones or ivory rods engraved with digits 0 through 9 and their multiples. The numbers were arranged in such a way that the answer to a complex multiplication problem could be found after rotating the rods by hand and adding the relevant figures.⁽¹⁵⁵⁾ “In 1617, he published his contribution which described the methods of fundamental operations of multiplication and division by means of printed cylinder bones. Napier's data tables and the mechanical device has a historical importance because of the scholarship and the mechanical ingenuity of its inventor”.⁽¹⁵⁶⁾

‘Blaise Pascal, the French scientist and philosopher, had invented an adding machine in 1642 that he advertised as suitable for all arithmetic calculations’.⁽¹⁵⁷⁾ “It was the first practical calculating machine by a 19-year old young man. Pascal was a mathematical wizard. Before he was out of short pants, he had created many theorems identical to those to be found in the first book of Euclid. He did this entirely without reference to books. Pascal went on to become one of the France's greatest mathematicians and philosophers”.⁽¹⁵⁸⁾

‘Pascal built his calculator when he became tired of adding long columns of figures while working in his father's Tax Collection Office in Rouen. His

152. The *bones* are made from slips of bone, wood, metal, or cardboard. Each of them is divided by cross-lines into nine little squares. In the top square, one of the digits is engraved, and the results of multiplying it by 2,3,4,5,6,7,8, and 9 are respectively entered in the eight lower squares. Where the result is a number of two digits, the tens' digit is written above and to the left of the units' digit and separated from it by a diagonal line.

153. Spencer, DD. *op.cit*.p.125.

154. *Ibid*. p.126.

155. Kimble, Gerald W. Information and computer science. New York: Holt, Rinehart and Winston, 1975. p.27

machine was based on the concept of gear-driven counter wheels, which had been used in almost every mechanical calculator for the following three hundred years. This calculator was a simple device about the size of a shoe box; however, it established three principles important to the development of later calculators: that a *Carry* could be accomplished automatically; subtraction could be performed accomplished by reversing the turning of dials, and multiplication could be performed by repeated addition. Pascal's machines worked very well, but only perform addition or subtraction'.

"A mechanical gear system was used to add and subtract numbers with eight columns of digits. The digits 1 to 9 and 0 were engraved on a series ten wheels. The wheels had teeth to represent numbers. The wheel in the extreme right indicated the units, the second to that indicated the tens, the third indicated the hundreds, the fourth the thousands and so on. The first calculator that could also multiply and divide was invented by Agottfried Wilhelm Leibnitz (1646-1716) in Germany and was first built in 1671.⁽¹⁵⁹⁾ Whatever the record was, Leibnitz took over Pascal's solutions of some difficult engineering problems by incorporating Pascal's device as the core of his own calculator".⁽¹⁶⁰⁾ "The inclusion of extra dials, gears, and shifting mechanisms clearly showed his own substantial contribution".⁽¹⁶¹⁾ As the machine could make a series of repeated additions, it is still being used in many modern digital computers. A working model of this machine was exhibited at the Royal Society of London in 1794. The machine embodied most of the essential features of the modern keyboard devices. In 1801, Joseph Jacquard, a French weaver, discovered a way to

156. Reader Digest. *op.cit.* p.378.

157. Kimble, Gerald W. *op.cit.* p.27.

158. Spencer, DD. *op.cit.* p.128.

159. *Ibid.* p.129-30.

160. Kimble, GW. *op.cit.* p.28.

161. *Ibid.*

automate complicated designs.⁽¹⁶²⁾ It is technique was to punch holes in cards selectively, and then to mount the cards on the loom so that the needs used in the weaving would be controlled mechanically. He was probably unaware that his punched cards provided the means for a new direct representation of quality (*digital*,⁽¹⁶³⁾ *binary*⁽¹⁶⁴⁾).

In 1786, JH Muller, a German, invented a calculating machine called a Difference Engine. Muller did not actually built the machine. A similar one was built around 30 years later by Charles Babbage (1792-1871).⁽¹⁶⁵⁾ Charles Babbage, the British mathematician, first conceived the idea of automatic computer able of performing a sequence of different operations or a set of programmes. By 1812, H.W. Burton mentioned in his “A memoir of the life of Charles Babbage, 1817” that Charles Babbage had the idea of calculating numerical tables by machines, later he held on the Chair of Mathematics at the Cambridge and become a fellow of Royal Society at the age of 24.⁽¹⁶⁶⁾ “He designed a computing machine for the purpose of producing ballistic tables called the ‘Difference Engine’ in 1822. He worked for eleven years on that machine but found it unsatisfactory for yielding the desired results. Then he conceived the idea of a new computing machine. In 1833, Charles Babbage imagined a totally automatic computer, thinking perhaps along the lines of the post of clerk analog. Its grandiose plan transcended his era’s technology, and its patience. He spent nearly the rest of his life (Thirty five years) trying to get his *Analytical Engine* constructed.”⁽¹⁶⁷⁾ *The Analytical Engine*

162. *Ibid.*

163. Digital, pertaining to digits or the representation of data or physical qualities by digits.

164. Binary- A system communication, particularly counting, using two possible status, e.g. presence or absence of a voltage, in coded combination. The binary system is represented by the numbers 0 and 1. It is used in computing, because bitable storage devices are reliable and cheap.

165. Spencer, D D. *op.cit.* p.130.

166. Teague, S. John. *op.cit.*

167. Kimble, GW. *op.cit.* p.29.

with all of its mechanism could claim as the first digital computer having memory and the calculating units as well as the sequential control with provisions for automatic printout".⁽¹⁶⁸⁾

The first real computer came into operation in the late 1940s under the guidance of John Von Neuman. Since then breathtaking progress has been made in the circuit design and architecture of computer.⁽¹⁶⁹⁾ A description of Babbage's machines would not be complete without some mention of Lady Ada Augusta, Countess of Lovelace. She was familiar with Babbage's work and helped document and clarify some of his efforts. She had considerable mathematical talent and developed several programmes for performing mathematical calculations on the analytical engine.⁽¹⁷⁰⁾ "During the eighteenth century, many attempts were made to improve the reliability of the machines invented by Pascal and Leibnitz, but the engineering production techniques of this period could not produce precision instruments. The first machine to perform basic arithmetic operations well enough for commercial use was the arith-meter, built by Charles Xavier Thomas in 1820".⁽¹⁷¹⁾ George Boole, the famous British logician and mathematician, discussed symbolic logic in 1859 in his work 'Treatise on Differential Equations'.⁽¹⁷²⁾ The general symbolic method, as discovered by Boole, has been accepted by all computer technicians. The development of symbolic logic and the application of binary logic operations, AND, OR, NOT, are his main contribution to modern computer technology. The symbols of algebra and logic have been used for representing logical forms. The theory of mechanization and operation of the whole of the computer system

168. Mahapatra, Piyushkanti. The computer in library services. Calcutta: World Press, 1985. p.5.

169. Gray, BS. Computer vis-a-vis university libraries in India: promise and reality. Library Herald, 1992 April-Sept; 31(1-2):25.

170. Spencer, D D. *op.cit.* p.133.

171. *Ibid.*

172. Mahapatra, P. *op.cit.* p.6. See also: Kimble, GW. *op.cit.* p.123.

based on two digits 0 and 1, is known as 'Boolean algebra'.⁽¹⁷³⁾ Claude Shannon noticed that Boole's mathematics also can be applied to switching circuits.⁽¹⁷⁴⁾ Modern computer switching theory, computer system, communications, etc. are based on the application of Boole's theory.⁽¹⁷⁵⁾ "The first commercially practical adding/listing machine was invented 1884 by William Seward Burroughs, who was granted a patent on it in 1888. He succeeded in developing a key-set adding/printing machine with a crank".⁽¹⁷⁶⁾

Dorr Felt, in 1885, designed an experimental multiple-order, key driven calculating machine. This machine was built from a wooden macaroni box and employed keys made from meat skewers, key guides made from staples, and rubber bands used for springs. In 1887, Leon Bollee of France designed the first machine to perform multiplication successfully by a direct method instead of by repeated addition. The device had a multiplying piece consisting of a series of tongued plates representing in relief the ordinary multiplication table up to X 9. The millionaire, a popular commercial calculating machine based on principles developed by Bollee, was manufactured in Switzerland. E. Steiger of Germany held the patents and released the machine in 1889.

Professor Howard Aiken at Harvard University returned in 1935 to Babbage's approach to computing a century before. He designed the MARK-I, sometimes called Harvard MARK I; its construction was completed during World War II by the use of the relay technology development in earlier Bell telephone. The construction of the machine took five years from 1939 to 1944. The machine

173. In mathematics, an algebra for expressing logical relationships between truth values. It is associated with such logical operations as AND, OR, NOT, etc.

174. Kimble, GW. *op.cit.* p.123.

175. Mahapatra, P. *op.cit.*

176. Spencer, DD. *op.cit.* p.133.

was a fully automatic calculator using business-machine components. It was called the Automatic Sequence Controlled Calculator. Following Aiken's success, University of Pennsylvania scientists Presper Ecart and John Mauchly, in 1946 exploited the tube circuits to design and construct the first electronic automatic computer ENIAC which stands for Electronic Numerical Integrator and Calculator.⁽¹⁷⁷⁾

“Aiken built the MARK II, the large relay computer in 1947. Another machine was also constructed by the people of the International Business Machine Corporation, New York World Headquarters in 1947 and was used through 1952. It was known as the Selective Sequence Electronic Calculator (SSEC). It was a faster machine than ENIAC. In 1948, IBM introduced a general-purpose electronic digital computer called the IBM 604. More than four thousand of these machines were built until production was stopped in 1960. The IBM 604 contained an electronic arithmetic and storage unit with over 1400 vacuum tubes and a separate card handling machine. All input/output operation were performed on punched cards”.⁽¹⁷⁸⁾ “Broadly, this development is reflected by the ‘*Generation*’ of a computer, the nomenclature denoting the technology used in computer design”.⁽¹⁷⁹⁾

The First Generation computers used valve technology, vacuum for control, for calculation, and sometimes for memory too. Vacuum tubes were unreliable, bulky, and generated large amount of heats. Machine such as the UNIVAC I, IBM 650, and IBM 704 belonged to the first generation of machines. The first generation period was 1940 to 1959.

177. Kimble, GW. *op.cit.* p.29.

178. Spencer, DD. *op.cit.* p.142.

179. Gray, BS. *op.cit.*

During the 1960s, dozens of companies began to manufacture high speed computers. "All of these machines were much faster and reliable than the early computers. Most of the machines made during the late 1950s and early 1960s belonged to the *Second Generation* of computers. These machine were much smaller, required less power, and produced much less heat. Since 1950 technology has brought us increasingly more compact and speedier computer, largely as the result of improved electronic components".⁽¹⁸⁰⁾ In first generation used valve technology, while transistors were used in the second generation computers. With transistors, the size of computers could be drastically reduced while their reliability was greatly increased. Machines such as the IBM 7090, IMB 7094 and PDP-8 belonged to this generation of computers.⁽¹⁸¹⁾

"ENIAC employed electronic components unlike the electro-mechanical components used by MARK-I, UNIVAC-I by the same designers".⁽¹⁸²⁾ ENIAC in 1951 became the first commercially available large computers as well as there were the products of *second generation* family. Since then, there have been many advances in computer technology. Computer technology made another great leap with invention of integrated circuit technology in 1960, where intricate electrical circuit is replaced by a suitable treated *chip*⁽¹⁸³⁾ of semiconductor nature 1.3 mm square to 5 mm square in size. Thus the *Third Generation* of computers came into existence. Actually, the third generation of computers appeared in 1964 when IBM announced the system/360.

180. Reader Digest. *op. cit.* p.382.

181. Spencer, DD. *op.cit.* p.146.

182. Robishaud, Beryl. *op.cit.* p.33.

183. In microelectronics, an integrated circuit device including its encapsulating package and circuit termination. The phenomenal growth in the microelectronics industry is due to the technology that produces circuits of increasing complexity, high reliability, low power dissipation and cost on minute wafers of silicon. Silicon itself is a gray semi-conductive material commonly found in the earth's crust.

Most computers made during the late 1960s and 1970s employed circuits for the computer's internal integrated circuitry. Third generation machines are smaller, more reliable, and faster than earlier machines. Alongwith the third generation computers has come newer and faster equipment for storage and handling of input and output.⁽¹⁸⁴⁾

The 1970s marked the beginning of the Fourth Generation of computers. Although the changes were subtle, no period saw so many important new changes in computer technology. More recently, computers have featured large scale integration of circuitry with various innovations in hardware⁽¹⁸⁵⁾ technology. These are referred to as *fourth generation* computers.^(186, 187) The IBM system/370 appeared during this period. Other machines that appeared in this period were the IBM 4300, IBM System/32, IBM System/3, MDah/470, Burroughs B6900, Honeywell Series 60, NCR 8500 Series, UNIVAC 1100 Series, Digital equipment Corporation's PDP-11, Control Data's CYBER 203, and CRAY-1. In the mid-1970s, Intel Corporation introduced several microprocessors, large-scale integration (LSI) chips containing the calculating and control elements for a computer. In 1979, Motorola introduced a microprocessor (MC6800) chip that contained the equivalent of 68000 transistors. About the same time, Motorola also introduced the MC6801 computer-on-a-chip, and Intel introduced the 8748 computer-on-a-chip. The microprocessor and microcomputer chips, about a quarter of an inch square, have the calculating capability of a room-size computer of only twenty-five years ago. Although still in its infancy, the chip has already given rise to one of control processing unit or printer, as opposed to programs, procedures, rules and associated documentation most astonishingly competitive and fastest-growing

184. Spencer, DD. *op.cit.*p147.

185. In computing, the term 'hardware' used to describe physical equipment such as a disk drive,

industries the world has ever seen. However, “research on *Fifth Generation* computers which may be regarded as a venture to develop artificial intelligence is now in full swing in Japan. These are based on innovative theories and technology. Hence they are capable of accommodating function such as intelligent conversation and inference functions employing knowledge bases”.⁽¹⁸⁹⁾

“By information technology is meant the present day convergence of technologies that are useful and profitable in their own right to form together a powerful new approach to information storage, transfer and retrieval. These are the technologies of computers, telecommunications and micrographics with microelectronics as the facilitator. This process has aptly been as ‘synergistic combination’, for the result of working together is much greater than the sum of the individual parts”.⁽¹⁹⁰⁾

Today computer-assisted retrieval is commonplace, using systems that combine the technologies. In this chapter consideration is given to the various electronic applications that are increasingly the carries of information in libraries. Far less noticeable to the library user than the new technology apparatus itself is the undoubted characteristic of information technology, that is the basis of paying for information is totally changed by it. The use of information retrieval equipment no longer requires any special understanding of computing techniques. Equipment is gradually becoming *user friendly*, with prompts coming up on the screen as to the next operating step and ‘menus’ of choices being displayed. Touch screens are the ultimate in user friendliness in removing even the need for ability to use a keyboard.

186. McGraw-Hill Encyclopedia of science and technology. New York: McGraw-Hill, 1977. p.iv:22-25.

187. Encyclopedia of computer science. New York: Charles Publication, 1976. P.580.

188. Spencer, DD. *op.cit.p.*147.

189. Kumar, PSG. *op.cit.*

190. Chartrand, RL and Morentz, JW ed. Information technology serving society. London: Pergamon Press, 1979. In: Teague, S John. *op.cit.* p.96.

***APPLICATION OF NEW TECHNOLOGIES
IN LIBRARIES IN DEVELOPED
COUNTRIES***

CHAPTER FIVE

APPLICATION OF NEW TECHNOLOGIES IN LIBRARIES AND INFORMATION SERVICES IN DEVELOPED COUNTRIES

Rapid changes in technology over the past decades are providing librarians and information scientists with an opportunity to participate in the development of new kinds of information technologies specially designed for their patrons, staff, administration and environment. In modern times, a library and an information center is a complex system of information dissemination. It is a system where the individual perform specific, inter-related tasks, designed to provide the most efficient service possible for the users.

The phenomenal advancement in information technology is causing consternation in the basic concept of libraries' house-keeping business. The recent technological developments in micro-electronics, telecommunications, computers and reprography have facilitated greater use of information resources.⁽¹⁾ "In past applications of technologies to the library, effort was concentrated on the use of equipment to do existing tasks in more efficient ways- an approach that is aptly termed mechanization. To little thought has been given to realizing the full potential of the machinery by changing traditional methods that were developed to

1. Bharagava, GD. 'Manpower for library automation: retrospect and prospect.' *Inf: Information handling in libraries in the 21st century*. ed. by RK. Sharma and BP Tripathi. New Delhi: Ess Ess Publications, 1989. p.2.

conform to the limited capabilities of the pre-computer years”.⁽²⁾ It is this broader view of the challenge of information technology that merits the term automation. Henry Dubester⁽³⁾ has still referred to the present state of library automation as the *second generation*. “While some libraries continue to live with first generation manual systems, he envisions the third generation as one in which libraries would be recognizably different because of the new technology”.⁽⁴⁾

In addition to the computers, which form the front-line in information technology, “there are other innovations which have contributed to information storage and dissemination. Micrographics greatly help in solving the problems of old records and archives. Electrocopier is another gadget which has proved a boon in quickly supplying the desired research materials and at economical costs”.⁽⁵⁾ With the fast and often path-breaking developments taking place in the field of information technology and the heavy use of this technology for library and information activities and services, it has become necessary to expose the various facets of the arena of information technology applicable in the libraries and information services. In a broad sense, according to Murthy and Shukla⁽⁶⁾ information technology covers the areas shown in *Fig. 2*.

To build a complete Mechanized system, library and information services must require practical application to expose to all areas mentioned in *Fig. 2*., depending upon the initiative. In fact, some of the most successful early uses of

2. Heilinger, Edward M and Henderson, Paul B. Library automation. New York: McGraw-Hill Book, 1971. p.xi.

3. Henry Dubester, addressed before the Joint Meeting of Chapter of the Special Libraries Association and the American Society for Information Science, Cleveland, Ohio, 19 Feb 1969.

4. *Ibid*.

5. Bharagava, GD. *op.cit*.

6. Murthy, SS and Shukla, Rita. Gaps in curricula of library and information science courses in Indian universities. In: **Indo US Conference of Library and Information Science Professionals. August 27-28, 1992; Seminar papers. Delhi: Department of Library and Information Science, University of Delhi, 1992. Session -2, Paper-7.p.2.**

computers were developed by the librarians.⁽⁷⁾ As early as 1936, a man named Ralph Parker developed a system in which library circulation was automated on punched cards.⁽⁸⁾ That system has had many refinements and various services systems all over the United States have been used the processing methods as a model.⁽⁹⁾

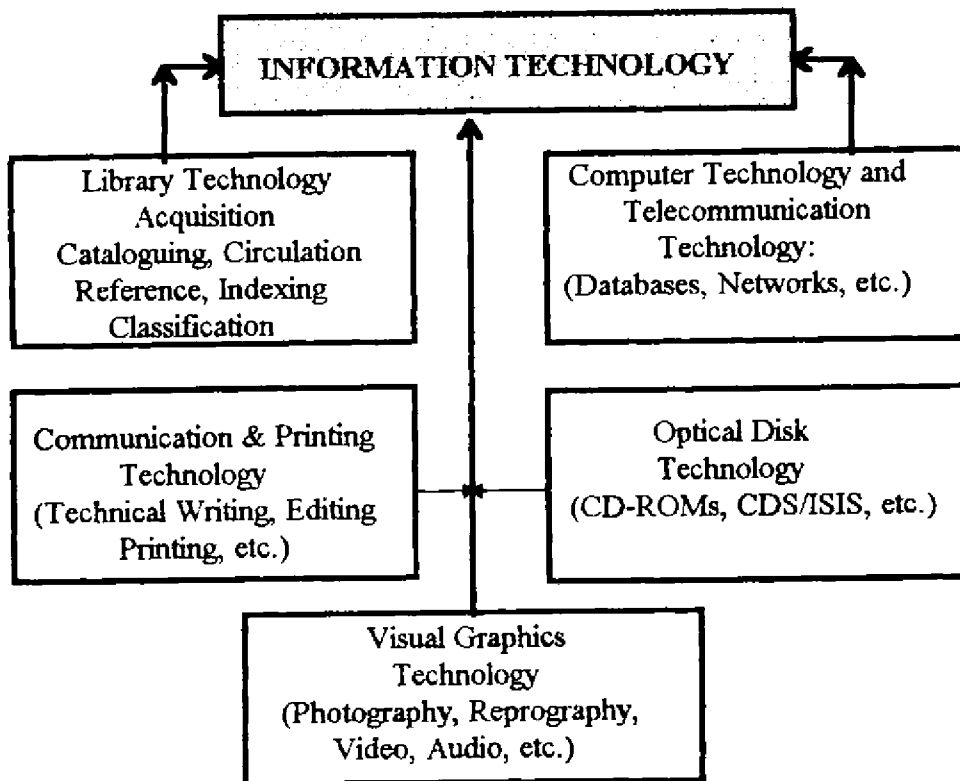


Fig. 2: Facets of Information Technology

Since the 1960s, libraries and information services used information technologies in general, and computers in particular, to automate a wide range of administrative public and technical services tasks.⁽¹⁰⁾ designed as an overview of major facets of

7. Rice, James. Introduction to library automation. Colorado: Libraries Unlimited, 1984. p.53.

8. Salmon, Stephen R. library automation systems. New York: Marcel Dekker, 1975. p.2.9. Rice, James. *op.cit.*

10. Saffedy, William. *Library automation: and overview. Library Trends*, 1989. Winter, 37(3):269.

automation activity. This study highlighted the current state of application of the information technology in major 5 areas of library work as well as in the information services shown in *Fig.-2*. For each area, the discussion indicates the motives for mechanization and intended to describe the current dominant approaches, citing examples of representative products, methods of applications, and the systems used in perspectives of acceptability.

LIBRARY TECHNOLOGY

“New Information Technology has its origin in the very simple devices used many years ago to record, process, and store data.”⁽¹¹⁾ The limited but real success of early equipment simply accelerated the efforts and accented the interest. Heillinger⁽¹²⁾ stated that “the introduction of computers for scientific computation and for commercial record keeping in the early 1950s created the possibilities for substantial mechanization of the libraries. The introduction of improved process capabilities and of random-access storage in the early 1960s marked the beginning of a decade of intensive mechanization efforts”⁽¹³⁾ and the prelude to application information technology in the library and information services.

The first and foremost task is to determine what a library is trying to accomplish and how the available and prospective technology can be used. Although information has been processed for thousands of years, before 1900 most information processing was done by hand”⁽¹⁴⁾. “Even typewriters and simple

11. Johnson, Elmer D. *Communication*. 3rd edn. New York: Scare Crow Press, 1966. p.41.

12. Heillinger, Edward M and Henderson, Paul B. *op.cit.* p.7.

13. *Ibid.*

14 Robichaud, B, Muscal, EJ and Hall, AM. *Introduction to information processing*. 4th end. Illinois: Macmillan, 1991. p.23.

calculating machines were not common until this century. Today, millions of computers are used for processing data for the purpose of human endeavor. Before 1950, there were none; nor were there any of the hand-held electronic calculators that are now so common".⁽¹⁵⁾

"In 1965, there was an early successful attempt to create an automated library system using both primary and secondary information. There were exclusive experimentation with storing information in microprint"⁽¹⁶⁾ as well as "in digital form i.e. binary codes. Digital communications networks, remote access through terminals, display or reproduction for users through microfilm or hard copy",^(17,18) automated retrieval of specific records and time-shared access to the system were also introduced. "It was a major undertaking and it involved actual utilization of these resources at the Massachusetts Institute of Technology in the Engineering Library".⁽¹⁹⁾ The 1970s offered promises of meaningful automation whether the methods of information technology can be adopted to the needs of the library. Enormous changes have occurred in information processing in recent decades. Some say that we are living in the age of Information Revolution. Almost everyday improvements are made in the ways we record, process, store, report, and communicate information. In the nineteenth century, many improvements were made in the manufacturing methods. As a result of the extensive use new technologies in factories, commodities could be produced faster and less expensively. Similarly, the information revolution is making it possible to produce the huge amount of information faster and low cost needed to operate our complex

15. *Ibid.*

16. *In micrographic microimages on opaque stock produced by printing as distinct from microimages produced on photo sensitive materials. An image too small to be read without some form of magnification. That is, the binary digits 0 to 1 to represent a letter, digit or other character in a computer.*

17. *In data processing, output in permanent form, usually by printing on paper.*

18. Longley, Dennis and Shain, M. Dictionary of information technology. 2nd edn. London: Mcmillan Press, 1984. p.147.

19. Hayes, Robert M and Becker, J. Handbook of data processing for librarian. Los Angeles: Melville, 1974. p.53.

necessity. If used properly, information technologies, especially computers can also make our individual lives more productive and rewarding, and offer many benefits to the society.⁽²⁰⁾

ACQUISITION SYSTEMS

Acquisition system is the fundamental work of the library functions.⁽²¹⁾ “Many times, the acquisition systems are integrated with accessioning, cataloguing, generating list of additions, etc.”⁽²²⁾ The acquisition function seeks to discover what materials exist that might fulfill objectives of the library and information services, to select and order those best suited to purposes that have not yet been met, to receive shipments, to claim all materials that fail to arrive, to preserve and replace the holdings, and to process the materials to the cataloguing function.⁽²³⁾

Mechanization of acquisition services has been very popular. Librarians were encouraged to borrow the techniques and devices that have been successful. Librarians are attached to mechanized and automated acquisitions by obvious advantages in eliminating typing of book orders, consolidating many individual files. Producing multiple copies of the current consolidated file or portions thereof for automatic monitoring service being rendered by various suppliers, and providing statistics about all phases of acquisition work.⁽²⁴⁾ However, function of the ordering and acquisition section of library and information services include two more activities: selection of materials and checking and forwarding bills to the accounts for final payment. These activities are directly linked up to acquire any materials in the library. These are routine jobs and requires repetitive operations.

20. Heilinger, EM etal. *op.cit.* p.7.

21. *Ibid.* p.8.

22. Kumar, PSG. Computerization of Indian libraries. Delhi: BR Publishing, 1987. p.111.

23. Sharma, CK and Arya, SB. Documentation information science and automation in libraries. Agra: Y.K. Publishers, 1988. p.189.

24. Heilinger, EM. *op.cit.*

The repetitive operations and the requisite checking can be very well done by the computer.⁽²⁵⁾

All the activities of acquisitions can also be operated as well by the same programming. "Acquisition is a good place to start considering computerization of library's total process. Since off-line has proved costly, libraries in European countries are using on-line system. On-line storage is cheaper. The European Space Research Organization (ESRO), Space Documentation Services (SDS) established in 1965 was one of the first centers to provide on-line searching facilities.⁽²⁶⁾ While University of Missouri Library, USA, developed an automated library materials ordering system on IBM in 1957".⁽²⁷⁾

The automation of acquisition of a sophisticated sort began in the mid 1960.⁽²⁸⁾ The University of Illinois at Chicago had computerized the library acquisition system on IBM/401 for an off-line system in 1964. The University of Michigan also introduced book ordering system in June 1965. This was also an off-line batch-processing system developed on the IBM/401 system. Since then a number of libraries in the USA, UK, and other developed countries, have started to introduce such systems.⁽²⁹⁾ However, with the decrease in the cost of on-line storage and the necessary hardware, several libraries switched on to on-line systems from off-line processing in the early 1970s. Perhaps, the earliest to implement an on-line system was the Washington State University in 1968.^(30, 31)

25. Mahapatra, Piyashkanti. *The computer in the library services*. Calcutta: World Press, 1985. p.67.

26. Convey, John. *On-line information retrieval*. 3rd rev.edn. London: Clive Bingley, 1989. p.20.

27. Kumar, PSG. *op.cit.*

28. Boss, Richard W. 'Automated acquisition systems: key note address'. *In* A reader on choosing an automated library system. ed.by Joseph R. Methews. Chicago: ALA, 1983. p.231. *See also* : **J Library Automation**, Sept 1980; 13(3):156-63.

29. *Ibid.*

30. Parker, RH. 'Automatic record systems at the University of Missouri Library'. *College Research Library*, 1962; 23:231-4.

31. Kumar, PSG. *op.cit.*

Therefore, acquisition is concerned with discovery, searching, selection, ordering, and receiving of all kinds of library materials, whether these be books, journals, newspapers, pamphlets, films, or microforms, audio-visual materials.⁽³²⁾ Acquisition activities are linked up with routine jobs in the library, requires repetitive operations. The repetitive operations and the additions, and checking can very well be done with the help of technologies, especially by the computer. By 1980 automation was accepted and well established in a wide variety of libraries.⁽³³⁾ Usually a librarian is responsible or developing the acquisition policy for a library. There are some guidelines that include decisions on what kind of materials to be acquired and how the acquisition budget is allocated among different funds. It is obvious that through the proper acquisition function, a library or an information center acquires materials to serve its potential users.

STEPS IN ACQUISITION

DISCOVERY

According to Heilinger's Statement it is to be expressed that 'every library user, and certainly every librarian, discovers the need for certain items that are available in the vast array of materials being offered by publishers and distributors, vendors or suppliers. This discovery may come through reading of reviews, conversation, perusal of the item itself, publishers' announcements, publishers' catalogues, bibliographies, library catalogues, readers' requests over telephone, fax, telex, or through personal knowledge of authors of the works'. Sometimes, requests may be received in many forms. Most libraries have printed slips available for those who wish to submit orders. Requests may be received by telephone or by fax, especially

32. Heilinger, EM. *op.cit.* p.25.

33. Woods, Rollo. *Library automation-II*. London: British Library, 1987. p.32.

if the person ordering it needs the item urgently. However, discovery of the existence of a publication through one or another of these contacts often results in a recommendation to the library for purchase or acquisition through other means. This leads to the 'searching process' in the library.

SEARCHING

Before an order is placed, the bibliographic information for the work as stated below must be searched and verified as well:

ELEMENTS	INFORMATION
Author	Correct form of name
Title	Full title, including subtitle
Edition	Version of the work: revised, second, etc.
Imprint	Place, name of publishers and date of publication
Unique number	ISBN or ISSN or Library of Congress card number

Searching has two goals:

1. to find-out whether the library already has the item, and
2. to find out where from and when the item can be obtained and at what price.

Automation makes it much easier to verify the bibliographic information. A well-designed data system can provide better access to bibliographic data for the requester. In practice, there will always be a residue of requesters who will not bother to have accurate or complete search. The searcher must use a wide variety of sources and considerable imagination just to obtain data usable in either human or machine processing. This involves the consultation of library-created files and other files, both of which are beginning to appear in machine-readable forms as reference and bibliographic tools. Library create files, including the shelf list, the catalogue, the processing files, and the circulation files (including circulation,

reservation and bindery). The 'other files' now include MARC (Machine Readable Cataloguing) tape and Books-in-Print on tape as well as the thousands of bibliographic and reference tools traditionally used in searching.

However, for most materials, instead of searching through traditional printed catalogues, bibliographies on the shelves or desk, the searcher can work at a computer terminal. At the terminal, a searcher enters a search to locate the bibliographic information for the title in the automated database: words or letters of the author's name or title (or combination) or a unique identification number (ISBN or ISSN and the Library of Congress Card Number). The search key usually retrieves a record that gives the full bibliographic information. In many automated system, the price and in-print information are also displayed on the screen of the terminal. The display may also show library holdings or orders. Thus library holdings are also checked to be sure that a copy of the title is not already in the collection or on order.

Data found in verifying and searching the bibliographic information may be used later by the cataloguing section to catalogue the item. ISBN or ISSN, The Library of Congress card number or another unique identification number (such as the control number in the automated database) may be added to the order form for later retrieval of the record. In some automated systems, the complete bibliographic information is captured (mode available) during pre-order search. To search ordering materials through an on-line system, one work at a terminal that is linked to a large database in a mainframe computer that is often located hundreds or even thousands of kilometers away.

At the terminal, one searches for and retrieve bibliographic information about the title to be ordered. The display may show whether the library already holds a copy

of the title or has ordered one. In some systems, one can also find out if the item is in-print or out of print and even what the price is.

SELECTION

Selection job can be benefited greatly from an automated data system. The computer cannot by itself decide that a certain item should be chosen for addition to the collection. However, it can be instructed to prepare order for items.⁽³⁴⁾ The librarian should implement the general policies for material selection having decided for his library. The degree of success of this achievement will depend on his methods and sources of selection and his knowledge on readers' interest.⁽³⁵⁾ Selection of library material is best done by library staff in association with the teaching staff, or researchers, or any other person potential to any organizations. Selection by the teaching staff or any other specialized persons alone will not produce a balanced stock with duplication of titles in response to actual demands by users. Selection by library staff alone will not be able to anticipate new subjects and interests being included in courses.⁽³⁶⁾

In Bangladesh including India, selection is done manually by going through the various bibliographical sources. In countries where centralized services are available, the MARC records generated by these agencies are being used for book selection. No library receives MARC tapes solely for this purpose. However, several libraries in the USA and UK as well as in other European countries have started using the weekly MARC tapes for creating the 'potential requirements file'. The University of Illinois acquisition system, one of the first to introduce computerized book ordering system, used an LC Catalogue for generating the order file.

34. Heilinger, EM. *op.cit.* p.27.

35. Sharma, CK. Book selection and bibliography. New Delhi: Metropolitan Book, 1976. p.42.

36. Francis, Simon. British Council University Library Seminars, Bangladesh: 18-20 March, 1986. Dhaka: The British Council, 1986. p.16.

The bibliographical data of the selected items were transferred to a separate file, and the final order was printed on a 3"x 5" slip. When the material was received, the same file was used for preparing a catalogue and a process information list (PIL). The book cards and book labels were also generated from the same data.⁽³⁷⁾

Some publishers in the United Kingdom "have started offering 'selection services' to subscribers. Two such important services are run by Oriel Bibliographic Services Ltd. and Blackwell Bibliographical Services Ltd. These services mainly provide information about forthcoming publications. Blackwell is offering the following services at present":⁽³⁸⁾

- i. **Blackwell Forthcoming Book Services:** This is produced monthly on COM Microfiche in author, title and class mark orders for books within 4-12 weeks of publication.
- ii. **Blackwell Work/MARC Tape Service:** This is produced fortnightly.
- iii. **Blackwell Pre-publication SDI Service:** This details of items of subscribers' interest to be published shortly.

ORDERING

Ordering, as distinct from selection, has many clerical tasks which lend themselves to automation. Such job as typing of book orders all day, everyday, are tedious for humans, especially in big libraries, but easy for the computer. Manual ordering requires a variety of titles that must be maintained at considerable expense in time and effort and are highly susceptible to filing errors. "Order done with a computer maintains one file for everything, and the computer does the filing accurately".⁽³⁹⁾

37. Rao, IK Ravichandra. *Library automation: working document etc.: DRTC Refresher Seminar. Bangalore: 1983. Quoted in:* Kumar, PSG. *op.cit.*

38. Tedd, LA. *Introduction to computer based library system.* London: Heyden, 1977. *Quoted In:* Kumar, PSG. *op.cit.*

39. Heillinger, EM. *op.cit.* p.29.

When selection is done manually, the bibliographical entries of the input for ordering should be standardized so that same data can be used for preparing catalogue entries, entries for addition lists, and for creating a central database for on-line and retrospective searches. "When selection is done using MARC tapes, this transaction is not needed as the entries are in a standard format. It is advantageous to follow MARC standard in order to have compatibility with the international systems".⁽⁴⁰⁾ The list of recommendations has to be run against the central database and the current order file in order to ascertain that the items are not in the library and to establish that the items are not already on order.

In all the systems are in vogue in Bangladesh, job of searching the file of items held by the library is being done physically as none of them has a central database. However, verification against the items 'in order' is done by searching the order file. An automated acquisition system involves at least two files: i. A file of all current orders, containing the main records, and ii. the second file containing the names and addresses of the vendors used by a library.

In practice, vendors or suppliers are selected usually by the authority who considers many factors in choosing. For example, one may give a good discount on orders but another may supply materials more quickly or efficiently. In Bangladesh, suppliers are selected through advertisement in the daily newspapers asking quotations from bonafide enterprises. Where there is computer used, before preparing the current order file, suppliers file may also be prepared containing the following information:

- | | |
|---|--|
| 1. <i>Vendors' or suppliers' code numbers</i> | 2. <i>Vendors' or suppliers' names</i> |
| 3. <i>Full addresses</i> | 4. <i>Telephone numbers</i> |
| 5. <i>Telex numbers</i> | 6. <i>Fax Numbers</i> |
| 7. <i>Cable/Gram</i> | 8. <i>Rates or discount, etc.</i> |

40. Kumar, PSG. *op.cit.*

As an official assigned to prepare a group of orders, one may know that these are all going to one of the suppliers used by the library. Or, one may have guidelines for different suppliers, according to the kinds of materials, the fund to be encumbered, or other factors. If one is preparing an order for video cassette, for example, the supplier will probably be different from a supplier of books. An order is also called a purchase order. There may be one item or several on a purchase order. The purchase order usually carries a unique number, assigned by the library or by the automated system, to aid in tracking the order.

ISBN or ISSN or LC or BNB is a unique number assigned to publications. It usually identifies exactly the book or serial that one wishes to order. Since titles are often similar or sometimes even identical, it is a good idea to include the unique number in the work order. An automated acquisition system requires it for better perfection. For saving time, orders are usually grouped by suppliers. Then, depending on the automated system used in the library, the order may be transmitted in one of several ways as mentioned below:

TYPE	METHOD
A. On-line	To the supplier on-line (directly or via bibliographic utility)
B. On-line Batch	To the supplier in a batch mode (data held and transmitted together at one time)
C. Mail	To the supplier by mail (Postal mail), using a multi-part form printed by computer

Sometimes in on-line system, the terminal may connect directly to the supplier's computer or it may access the computer of the bibliographic utility used by the library. The utility, in turn, forwards the orders electronically to the suppliers, perhaps combined with orders to the same suppliers from libraries simultaneously.

If the order is transmitted electronically to the supplier, the library receives a copy of the purchase order later. This is a list that shows the status of the items ordered: shipped, back ordered (to be shipped later), out of stock, out of print, etc. Creating a user's file is also essential because the user number is to be recorded in the order file. Whenever the material is received, the user is to be informed. The user file generally consists of 1. *User's number* 2. *User's name* 3. *Address in full* 4. *Telephone* and 5. *Facsimile (Fax)*

But where there is no on-line facilities the batch mode or mailing systems are effective method to communicate with the selective vendors in the libraries

RECEIVING

After an interval of time, the ordered item is received in the library. This may happen within a few days or even the same day. Receiving involves matching the items with invoices accompanying the shipment, returning the wrong items, claiming missing items (after checking against a copy of the original order), and reporting damages or defective (lacking pages, for example, or bound upside down), etc. Later to be compared the received materials with database and sorted out. Any type of defaults found, these are transmitted through E.mail, or over telephone to meet at once.

INVOICE RECEIVING

Sometimes the invoices may be arrived through the mail (e.g. e.mail, Fax, etc.) separately from package. Any written communication may also be sent through electronic devices if these were installed in the library earlier for the acquisition purposes.

MATCHING

A sheet of paper listing the items in the shipment is usually enclosed in the package. This may be only a packaging slip or it may be the invoice (bill) or both. The invoice is needed to pay for the item. Sometimes, not all of the ordered items may not be arrived at the same time in such cases the invoice must be held until the rest of the items are received before it can be cleared for payment.

RECEIVING MATERIALS

In automated acquisition systems, as each item is received, it is also entered at the terminal. One calls up the item by a search key and changes its status from "on order" to "received".

STAMPING

Proper marks must be put on the items received as soon as possible to reduce the danger of pilferage.

SEPARATION

Separation of different kinds of items takes place at the receiving point. Purchased books, serials, documents, gifts and other special materials are each treated differently and must be identified as belonging to one group or another.

SHORTING OUT

Occasionally, a supplier sends the wrong item, because of its mistake or an error in the order. Or in the mailing. Later, a printed letter is sent enclosed with a defective or incorrect item that is being returned.

CLAIM

Sometimes, an item that has been ordered does not arrive when expected. It may be delayed for reasons, but when an item does not arrive within a reasonable time, the library claims it, that is, contacts the supplier to ask why it has not been received. However, in an automated system print- claim letters to be sent to the suppliers are generated automatically if the item has not been received within a pre-established date. The date is calculated by adding a certain number of days to the order date, based on the supplier, the type of materials, the country of publication and other factors. Usually, claim letters are reviewed by the acquisition librarian, or a person responsible, before items are mailed. There may be some other reasons why the item has been delayed, missing or damage, for which claim letter should be sent through e.mail devices or by Fax transmission for as easy communication as quick response.

QUERY

Sometimes, little or no bibliographic information can be found for a title. One may not be able to find out from the usual sources whether the item is in print or what it costs. For example, some- one may have heard of a report from an association but not know the exact titles. In such a case, one prepares a query letter, asking about the availability and price of the item and mails it to the likely vendor (Publisher or other supplier). With a microcomputer that has a printer attached, any one can easily produce a form letter for a query. One can also maintain a file of queries. When a reply is received, the query is deleted. Also queries that have not been answered for a long time can be removed from the file.

CHECK AND PAYMENT

Once all the items on an invoice have been received, one checks the invoice to be sure that the price of each item is correct. If there are any discrepancies in the invoice, this may need to be referred to the librarian for taking decision as well. Usually if there is no difference with the invoice, the payment is authorized according to policies. Through LAN or using e.mail facilities Accounts Department can easily verify the files of the library with the computer terminal for making payment to the vendor(s).

IDENTIFICATION

The assignment of sequential numbers to each item accepted for the library's collection must be made as soon as convenient. These unique control numbers may be assigned to all items to help in keeping track of their movement and in everyday work after they have been processed. These numbers are assigned for convenience of control and will remind the librarians of the accession numbers that were convenient for manual applications. Such numbers have been limited to books, but can and should cover all materials. Identification for acquisitions also concerns the total input of data at the time of ordering and accuracy with which the process can be accomplished. Although MARC copy provides the information needed after receipt of the item, it does not have all the data needed for acquisitions, such as prices, supplier's name and mailing address, etc. A standard input code for acquisition can supplement the MARC data. At present, coding sheets prepared by the acquisition librarians are handled to a key-punch operator or a paper tape machine operator.⁽⁴¹⁾

41. Heillinger, EM. *op.cit.* p.32.

However, when the item received, it has to be accessioned. The entry in the order file is to be transferred to the *Accession File*, and certain other data are added to the entry. The data elements of an accession file are: i. Date of accessioning, ii. Accession number, iii. All the data elements of the order file, (i.e. author, title, edition, imprint, pages, etc.) except for the estimated price, iv. Bill number and date, v. Cost in foreign currency, vi. Cost in local currency, vii. Status (whether withdrawn or not), viii. Call number ix. Books by gift or not x. Books by exchange or not xi. Sources of the gift or exchange items received by way of exchange and gift are also added to the accession file. The *Accession File* is generally used for generating the 'list of additions', notification to the users about the receipt of the new items, shelf list, and the catalogue record. Local information, such as call number, accession number, etc. are added for creating these files.⁽⁴²⁾

CATALOGUING

"Catalogues are simply one of the many forms of bibliographies, differing from the other forms in that they record only the documents in one collection. They are prepared mainly to overcome the limitations of document arrangements"⁽⁴³⁾. The cataloguer describes an item and indicates its logical place among thousands, perhaps millions, of other items. The description is intended to capture all the pertinent data about the item and to reveal its content, appearance, source, and relation to other items. The cataloguers' description is, ideally, written with all present and future potential users in mind; the shortcomings of such message writing are obvious and serious.⁽⁴⁴⁾ Basically, like other bibliographies, a catalogue

42. Kumar, PSG. *op.cit.* p.124.

43. Heillinger, EM. *op.cit.* p.37

44. Heillinger, EM. *op.cit.* p.37.

is an arrangement of entries representing documents. Each entry is in two parts, a *heading* and a *description*, as the following example illustrates:⁽⁴⁵⁾

i. Heading	Damsell, Dennis Henry Modern everyday scene. - - London: Dent, 1961.
ii. Description	92p.; - illus; 26 cm. <i>For children.</i>
	9357 500

Fig.-3: Catalogue entry

Therefore, the item is found in the catalogue through access points. For a book, the access points usually include the author's name, title, and subjects (non-fiction), but there are many other access points, described depending on the type of materials. For example, the access points for a sound recording of an opera include the names of the leading singers and the conductor in addition to the composer's name. However, the description should contain the author's name if it is to be self-contained, but as the name appears in the heading, it is often, in practice, omitted. If there are other authors mentioned in the heading, they may be included in the description.⁽⁴⁶⁾ The description includes the classification number or any other location number of a document by which it is arranged on the shelves for its reader. On the other hand, the heading is the element by which the entry is filed in the catalogue. For example, if the entry is made on author heading, it is an author entry. Similarly, if the entry is filed on subject or title, then it is called a subject entry or a title entry respectively.

45. Needham, CD. *op.cit.*

46. *Ibid.*

An automated cataloguing system includes the following steps.⁽⁴⁷⁾

STEPS	ACTIVITY
1. Locate (or create) record for the file	<i>Search a data base for record prepare an original record if one is not found.</i>
2. Edit the record	<i>Modify the record, according to the cataloguing standards and practice in a library.</i>
3. Add copy-level data	<i>Add location, local note, volume of copy number, and a machine-readable number/symbol.</i>
4. Add the record to library's catalogue.	<i>Produce and file catalogue cards and/or the add the record an automated database for an on-line or printed catalogue.</i>
5. Maintain the catalogue	<i>Add, delete, or change access points; delete records for title that are no longer held.</i>
6. Maintain the shelf list	<i>Maintain a file that represents items as they are arranged on the shelf.</i>

Fig,-4: Elements of automated catalogue

The processing department may also process the item for the shelf with these steps manually as well:

A. Stamping the item with a library ownership stamp. B. Writing call number in the item. C. Attaching a printed or handwritten label with call number to the spine. D. Inserting a pocket with a book card. E. Pasting in a date due slip.

TYPE OF CATALOGUING SYSTEM

In automated cataloguing practices, following systems are closely linked to library:

- 1. On-line with a bibliographic utility**
- 2. On-line with a computer in the library (or in a nearby library)**
- 3. Off-line, by ordering products from a supplier**

47. Tracy, JI. *op.cit.*

On-line with Bibliographic Utility:

A significant example of foresight in library automation came from Vannevar Bush. At the Massachusetts Institute of Technology, Bush had built a Differential Analyzer which led to the development of modern analog computer.⁽⁴⁸⁾ He had also done a lot of research in microfilm retrieval. In 1945 Bush⁽⁴⁹⁾ as drew a detail picture about the future of automation as follows:

"a future device for individual use which is a sort of mechanized private file and library... which is mechanized so that it may be consulted with exceeding speed and flexibility... . It consists of a desk... . On top are standing translucent screens, on which material can be projected for convenient reading. There is a keyboard, and sets of buttons and levers."

Later, in 1965, Bush was to attend an important conference which led to one of the key early developments in library automation.⁽⁵⁰⁾ These developments, as well as many other library automation projects are discussed in this chapter. With the development of on-line systems, it became less necessary to store records on cards. Data could be put in as transactions occurred, organized into a standardized record format, as stored on disk or tape. Then, when information was retrieved through an interactive on-line process using computer terminals, on-line computing evolved into time-sharing system, in which many (sometimes thousands) of terminals were connected to a single computer system with a centralized database and multi-purpose software.⁽⁵¹⁾

48. Becker, Joseph. The first book of information science. Washington, DC: US Atomic Energy Commission Office of Information Services, 1973. p.78.

49. Bush, Vannevar. 'As we think.' *Atlantic Monthly* 1945 Aug; 176:106.

50. Salmon, Stephen R. Library automation systems. New York: Marcel Dekker, 1975. p.5.

51. Rice, James. *op.cit.* p.53.

Any library may belong to one of the following bibliographic utilities:

The On-line Computer Library Centre (OCLC)

The On-line Computer Library Centre (OCLC) Inc., an on-line bibliographic data base in 6565 Frantz Road, Dublin, Ohio 43017-0702, in United States of America, is a nonprofit, membership organization operating international computer network for more than 4000 libraries in the 37 countries and territories. OCLC systems help libraries locate, acquire, catalogue, and lend books and other materials.⁽⁵²⁾ The OCLC data base constitutes one of the largest card catalogues in the world, with over 4 million cataloguing records representing book and other publications in approximately 1,600 libraries throughout the United States.⁽⁵³⁾ However, OCLC is the largest, most influential and significantly effective shared cataloguing system, with its headquarters at Columbia, Ohio in the United States of America. Established in 1967 to act as a computerized regional library centre, OCLC kept its records compatible with the MARC II format for its cataloguing system to take part in any future national system.⁽⁵⁴⁾

OCLC began in July 1967. Within a decade, it had grown to hundred people. In 1967-68, total assets were \$62,000. Currently, OCLC is housed in a \$4.2 million facility in Columbia, Ohio, and the annual report for 1976-77 showed total assets of \$13 million.⁽⁵⁵⁾ The present hardware includes one Xerox Sigma 7, six Xerox Sigma 9 computers, and two Tandem T16 microcomputer systems, one functioning as a "database processor" and other as a network supervisor.

52. *Asian Libraries*, March 1991; 1(1): 100.

53. OCLC: a national library network, ed. by Allison, Anne Marie and Allan, Ann. London: Mansell, 1979. p.11.

54. Sharma, CK and Arya, SB. *op.cit.*

55. Ohio College Library Center. *Annual report. 1976-77*. p.23.

The database processor is geared to improving reliability and increasing capacity while *network supervisor* channels all messages between the computers and over 2,200 CRT terminals located in more than 1,600 institutions throughout 46 states.⁽⁵⁶⁾

The On-line Computer Library Centre, Inc. (OCLC) was previously known as the Ohio College Library Centre.⁽⁵⁷⁾ The earliest major computerized reference tools were the cataloguing database of OCLC (which fostered the database). Although OCLC was designed as a cataloguing rather than a reference tools, reference librarians had realized its value for reference services by the mid-1970s, and began lobbying to have terminals placed in public service areas for both librarian and public use.⁽⁵⁸⁾

By 1977 it had expanded its services to embrace over, 2500 academic, public, special and federal libraries through the United States and overseas. In the words of its promotional booklets, its two fundamental objectives are 'to increase availability of library resources for users of member libraries, and to reduce the rate of rise of per-unit cost in libraries'.⁽⁵⁹⁾ To achieve its objectives OCLC designed a computer network system with provision for subsystems: cataloging, serial controls, inter-library loan, acquisition, circulation control, and remote catalogue access, and information retrieval and subject access; the first four of these are operational.⁽⁶⁰⁾

56. Allan, Ann. An introduction to OCLC. In: OCLC: a national library network. *op.cit.* p.13.

57. Sharma, CK and Arya, SB. *op.cit.* p.235.

58. Miller, William and Gratch, B. *Making connections: computerized reference services and people. Library Trend* 1989 Spring; 37(4):388.

59. Thompson, James. *op.cit.* p.44.

60. *Ibid.* p.45.

Libraries have access to OCLC's database through three approaches.⁽⁶¹⁾ The most common approach is based over telephone lines linking the cathode-ray tube (CRT) in the local library to the OCLC database. On the other hand, smaller libraries find it more economical to go through Tymnet or Telenet, which are commercial time-sharing services that act as brokers for many on-line⁽⁶²⁾ databases. In this case, the equipment found in the library is a typewriter-like printer with a telephone on which one dials the local Tymnet number. A code to access the OCLC database is typed and the phone placed on an acoustic coupler. The typewriter prints the information that otherwise would appear on a CRT screen. The third approach is used by even smaller libraries, receive OCLC-produced catalogue cards either by sharing CRT's with nearby libraries, by purchasing cards through a member institution to which they belong (e.g. the county library), or by acquiring the cards through the source from which they buy their books, such as a State Library processing centre having an OCLC membership. Thus, even though only 1,600 libraries have on-site CRTs, many more actually receive OCLC-produced cards.⁽⁶³⁾

OCLC's cataloguing database is the largest in the world.⁽⁶⁴⁾ In February 1980 it contained over 6 million records (having reached its first million in 1974, second in 1976, third in 1977, fourth in 1978, and fifth in 1979). It is growing at the rate of 25,000 records weekly, of which some 21,000 are contributed by member libraries, and the remainder derived from MARC. In terms of language distribution, 75% in English, 6% in German, 5% in French, 5% in Spanish, with all other languages being represented by the remaining 9%. In terms of types of

61. *Ibid.*

62. 'On-line' means that through a libraries cathode-ray tube (CRT) terminal, one can directly access the information in the OCLC computer.

63. Allan, *Ann. op.cit.* p.15.

64. Thompson, James. *op.cit.* p.45.

65. *Ibid.* p.45-6.

materials, the bulk is books (87.6%), with 6.1% serials. The remaining ones are: films, sound recordings, maps, and manuscripts.⁽⁶⁵⁾ OCLC was highly successful. By 1977, it was a nationwide and international multi-type library network and the cooperation changed its name to OCLC, Inc. In 1980, it became OCLC On-line Computer Library Centre and was well known as one of the most significant developments in the history of the librarianship.⁽⁶⁶⁾

Its database provides information used by researchers, students, faculty, and scholars as well as professional librarians. "OCLC recently processed 1,62,446 bibliographic records from the National Library of Australia through OCLC's TAPECON Services. The project set holdings symbols for the National Library of Australia to matching records in the OCLC On-line Union Catalogue (OLUC). The OCLCTAPCON Service is a tape-to-tape batch processing service that allows libraries to upgrade their records to full MARC format without having reeked data that is already on tape".⁽⁶⁷⁾

BALLOTS

Probably OCLC's first major competitor for the library automation market was **BALLOTS** (Bibliographic Automation of Large Library Operations using a Time-sharing System).⁽⁶⁸⁾ BALLOTS was established in 1967, but actually started operating from 1972 with the capacity of searching the MARC database and using it to produce catalogue cards. BALLOTS is an effective on-line system in the area of academic libraries and offered a very sophisticated searching system. The BALLOTS system was originally implemented at Stanford University and

66. Rice, James. *op.cit.* p.57.

67. *Asian Libraries*, March 1991; 1(1):100.

68. Rice, James. *op.cit.*

was used in their main library. It was set up in 1972 as a fully integrated library system. BALLOTS was implemented to support cataloging and technical processing at the Stanford University Libraries. It began with the on-line file of MARC database and expanded with input cataloging. MARC records are the main sources of bibliographic data. The sharing of cataloging records has been made easier in this system. The BALLOTS has expanded much and various regional networks affiliated with this system are also sharing in the cataloging.⁽⁶⁹⁾

By the mid seventies BALLOTS was a multi-type library network operating primarily in California and also in other states. Although it had a smaller database than OCLC, it had a better reputation for quality in its records as well as more sophisticated searching capabilities. The most significant advantage of BALLOTS was its ability to retrieve records by words from the title, subtitle, series or from corporate names or conference entries. For BALLOTS, this led the way to developing even more sophisticated subject access. BALLOTS also provided a better system for checking the quality of input records to ensure a better-resulting database. Another characteristic of BALLOTS was that it had a database of items that were more oriented to research library collections.

Cataloging is done through on-line terminals with the acquisition record disciplined on the screen. In case of revision or amendment, the catalogue data on the screen are revised with necessary changes. It also produces catalogue cards and cross references in filing sequences. If the record is not obtained from the MARC file, it may be searched through the on-line BALLOTS/MARC file if a MARC record is available. If the MARC record is available, record is made according to this, and if not available, it is not used. The system will automatically find the MARC record, whenever it will be available. The system is operated with a host

69. Mahapatra, Peyushkanti. *op.cit.* p.116.

computer, a powerful minicomputer and more than 150 terminals.⁽⁷⁰⁾ Although not as widespread as OCLC, BALLOTS on-line system combines some of the features of OCLC, some of Lockheed/SDC, and some features are not available in either of the other two systems.⁽⁷¹⁾

RESEARCH LIBRARIES INFORMATION NETWORK (RLIN)

The Research Library Group (RLG) was founded in the year 1974 to foster cooperation and share resources among large academic libraries in the United States. Originally, it was composed of Harvard, Yale, New York Public Library, and Columbia. By 1983 it had grown to comprise twenty-five research libraries.⁽⁷²⁾ With the award by RLG, BALLOTS was adopted as the basis for a new network to be offered nationwide for research libraries. The Research Library Information Network (RLIN) immediately began to respond to the needs of large academic libraries. However, RLG acquired the BALLOTS bibliographic data system of Stanford University and started its own bibliographic utility known as the Research Library Information Network (RLIN) in 1978.⁽⁷³⁾ The RLIN database grew rapidly and by 1983 its overall size was nearly as large as that of OCLC.⁽⁷⁴⁾ RLIN also offered various subsystems, including acquisitions, machine-readable conversions services, inter-library loan, serials, and subject searching. The other programmes of RLG are based on shared resources. These three programmes depend on RLIN as telecommunication medium and a database. Also by 1983, as was the case with OCLC, RLIN was moving toward a distributed network. This means that the database could be centrally accessed through RLIN but many library automation functions would be accomplished at the local level. A

70. *Ibid.* p.117.

71. Hunter, Eric J and Bakewell, KGM. Cataloguing. London: Clive Bingley, 1979. p.138.

72. RLG, Press release. 1983 March.

73. Mahapatra, Peyushkanti. *op.cit.* p.148.

74. Rice, James. *op.cit.* p.57.

key example of this was the plan for compatible on-line public access catalogues at each local library with continued maintenance of the union catalogue by the RLIN system.⁽⁷⁵⁾

The setting up of the RLIN by the RLG fulfilled the need for a bibliographic database to serve the academic people, in particular, for furthering higher education and research. The RLIN database comprises more than 2.5 million book records, 0.3 million other records, 2,25,000 archive records, 3,90,000 serials records, 1.8 million authority records and 1,10,000 records in other formats.⁽⁷⁶⁾

The Washington Library Network (WLN)

A third network, the Washington Library Network (WLN), was started in 1978.⁽⁷⁷⁾ WLN offered the same basic type of shared cataloging services through a large bibliographic database beginning with MARC and growing rapidly. Yet, most libraries have chosen to use one of the four bibliographic utilities, i.e., OCLC, RLIN, UTLAS, and WLN. It is relatively a small library network, but the software development for its regional database since the late sixties made the WLN software a very important one.

Although the direct service of the network is limited to a relatively small geographic area, the inter-network service extends the sophisticated WLN software to other parts of the country, and this has proved more efficient because of certain improvements, such as better indexes, efficient subject search, better authority control and faster response time.

The use of an on-line cataloging system, such as that provided by a bibliographic utility, will improve the cataloging productivity within the library by reducing the

75. *Ibid.*

76. Mahapatra, P. *op.cit.* p.149.

77. ALA yearbook:1981. s.v. *Automation.*

amount of original cataloging that is necessary to create. The computerized bibliographic database was established in 1972 with the cooperation of Washington libraries. The on-line system was introduced in 1975. More than 60 libraries or library systems in the six states became on-line participants in WLN. It includes various types of libraries.⁽⁷⁸⁾ The WLN provides sufficient authority control for cross-referencing, search capabilities, including truncated values, Boolean operators and access by subject, circulation control, acquisition functions on the same terminal as cataloging and inter-library searching, products like the COM (Computer Out-put Microfilms) and the microfiche catalogues.⁽⁷⁹⁾

University of Toronto Library Automation Systems (UTLAS)

University of Toronto Library Automation Systems (UTLAS) in Canada is a regional library system created on commercial basis. The UTLAS network is diverse in the type of libraries it serves and the products it generates. It generates products for 1500 catalogues of 500 libraries in 5 continents.⁽⁸⁰⁾ Catalogue cards production has reached over 8 million per year. About 60 computer out-put microfilm (COM) catalogues in microfilm and microfiche and 100 book-form catalogues are produced annually. It offers an integrated approach to library automation based on a distributed processing network.

Since July 1978, UTLAS created a fully computerized on-line Catalogue Support System (CATSS), providing client libraries with facility to build and maintain useful and flexible databases. UTLAS entered the United States market in 1980.⁽⁸¹⁾ Users of UTLAS have access to database of over 6 million records growing at the rate over 2.5 million record per year.⁽⁸²⁾ This includes source files from the

78. Mahapatra, P. *op.cit.* p.150.

79. *Ibid.*

80. *Ibid.* p.117.

81. ALA yearbook: 1981. s.v.Automation.

82. Mahapatra, P. *op.cit.*

Library of Congress, the National Library of Canada, including CAN MARC, CONSER and UK MARC, the bibliotheque Nationale du Quebec, and the records of the National Library of Medicine. In addition to the national source files, there are user-created records.

INTREX

Project INTREX⁽⁸³⁾ was an early attempt to create an automated library system using both primary and secondary information. INTREX (INformation TRansfer EXperiments) began in 1965 with three basic objectives:⁽⁸⁴⁾ 1. to apply automation technology to library processing, 2. to promote the growth of a national network of library and information centres, and 3. to evolve toward on-line interactive library automation and information retrieval systems.

The project also studied digital communication network, remote access through terminals, display or reproduction for users through microfilm or hard copy, automated retrieval of specific records, and time-shared access to the system. It was a major undertaking and it involves actual utilization of these resources at the Massachusetts Institute of Technology in the Engineering Library.⁽⁸⁵⁾ INTREX ended in 1973 having provided a great deal of information for future automations.

CONSER

Another project with national impact was *CONSER* (CONversion of SERials), initiated by the United States in 1974. Operated by the Council on Library Resources, this database of serials records was built using the OCLC system. It began with a large database of serials from Minnesota Union List of Serials (MULS).

83. Salmon, Stephen R. Library automation systems. New York: Marcel Dekker, 1975. p.5.

84. Rice, James. *op.cit.* p.54.

85. Hayes, Robert M and Becker, Joseph. Hand book of data processing for libraries. 2nd edn. Los Angeles: Melville, 1974. p.53.

Now it is a cooperative project undertaken by the LC, the National Library of Medicine, and National Agricultural Library, and other participatory libraries. The retrospective and current serials records are being converted to the Machine-Readable form. Although the initial plan was for LC to take over the maintenance of the database, because of lack of LC funding, OCLC ultimately took over administration of CONSER in the late seventies.⁽⁸⁶⁾ It amounts to a national on-line serials database which provides holdings information, authority control, and many information retrieval services.

MARC: Revolution in Cataloging

The application of mechanized methods to prepare library catalogues was innovated by the Unit Record Equipment. The catalogue data were key-punched, and the punched cards were filed in relevant sequences. Catalogue entries were limited to the minimum.⁽⁸⁷⁾ A large number of book catalogues were produced in the US in the 1940s using unit record machines.⁽⁸⁸⁾ Notwithstanding certain limitations, many punched cards catalogues were produced and printed in the fifties. The punched card catalogues were mainly for book catalogues, but catalogue cards were also punched. Then, automatic typewriters were used for producing catalogue cards. The input medium was either punched paper tape or magnetic tape. In punched cards, only upper case letters were printed, but in automatic typewriters, both upper and lower case letters were available. The paper tape machines with some auxiliary devices could produce both sequential entries and catalogue cards. During the sixties, such mechanical cataloguing devices were used.⁽⁸⁹⁾ But, with availability of computers in the seventies,

86. Rice, James. *op.cit.* p.61.

87. Sharma, CK and Arya, SB. *op.cit.* p.230.

88. Kumar, PSG. *op.cit.* p.141.

89. Sharma, CK and Arya, SB. *op.cit.* p.231.

typewriter became obsolete. In automated cataloguing, the bibliographic record is machine readable, which means that the computer can accept, interpret, store, and manipulate the data in the record. Therefore, computers operate on data. They accept and process data and communicate results.⁽⁹⁰⁾ During sixties, computers were used in cataloguing, obviously, of the off-line system. Catalogue data were punched in cards as in the paper tape or in the magnetic tape.⁽⁹¹⁾ Later, most automated cataloguing systems used the **MARC format** developed at the Library of Congress (LC). The culmination of the concept, for both United States and Great Britain, came with LCs MARC project set up in 1964.⁽⁹²⁾

The Library of Congress's involvement in cooperative cataloguing—that is, cataloguing for more than just one library dates long way back.⁽⁹³⁾ LC began in 1899 to print catalogue cards for copyright books, and in 1901 undertook to do this for all its books and to sell the cards to other libraries, thus becoming in effect a central Cataloguing Bureau for the United States (for the other countries also). Much the same idea lay behind the launching in Britain in 1950 of the services of the British National Bibliography. MARC supplies cataloguing data centrally for current books, in machine-readable form, which individual libraries can then use to produce their own catalogue entries.⁽⁹⁴⁾

In the United States, the LC led the major effects beginning with a original definitive study of automation⁽⁹⁵⁾ and culminating in an established standard for computerized cataloguing in the MARC programme. The introduction of computers in the late 1950s accelerate the use of automated techniques in the

90. Sanders, Donald H. *Computer today*. New York: McGraw-Hill Book, 1985. p.37.

91. Sharma, CK and Arya, SB. *op.cit.* p.231.

92. Thompson, James. *op.cit.* p.44.

93. Thompson, James. *A history of principles of librarianship*. London: Clive Bingley, 1977. p.32.

94. Thompson, James. *op.cit.* p.44.

95. King, GW, etal. *Automation and the Library of Congress*. Washington, DC: Library of Congress, 1963.

Library of Congress. Before the MARC project was received, the Library of Congress investigated the feasibility of using library automation for its internal operations in the late fifties.⁽⁹⁶⁾ As a preliminary step, the LC received a grant from the Council on Library Resources (CLR) for a study to determine the feasibility and implementation of automated techniques in library operations. The appointment of King Committee to survey the scope of mechanization in Information Retrieval (IR) in 1958 can be regarded as corner-stone in the progress toward automation at the Library of Congress.⁽⁹⁷⁾ The final report of this survey published in 1963. Report was prepared by Gilbert W. King.

Following the King's Report on automation in the Library of Congress.⁽⁹⁸⁾ a programme aimed at the eventual production of cataloguing data in machine-readable form, i.e. MARC (MACHINE Readable Catalogue), was established. For this LC acquired two big computers- an IBM 1401 with four tape units and an IBM 1403 in 1963.⁽⁹⁹⁾ The King's Report was considered in the first conference on Machine-Readable Cataloguing held at the Library of Congress in January 1965.⁽¹⁰⁰⁾

In December 1965, LC received a further grant from CLR for the development of a pilot operation to test the feasibility and utility of the distribution of the MARC data to users libraries. The experimental project was finalized in April 1966 is referred to as MARC I. Cataloguing records for new acquisitions at the LC were converted into Machine-Readable form according to the standardized format which had been developed in April 1966.⁽¹⁰¹⁾ The first magnetic tapes of these records were mailed to 16 libraries particularly in the pilot study in October 1966. By

96. Sharma, CK and Arya, SB. *op.cit.*

97. Kumar, PSG. *op.cit.*

98. King, GW, *etal. op.cit.*

99. Kumar, PSG. *op.cit.*

100. Sharma, CK and Arya, SB. *op.cit.* p.232.

101. Rice, James. *op.cit.* p.54.

1968, some 50,000 records had been converted and distributed.⁽¹⁰²⁾ The basic aim of the MARC project was to develop a record structure that could accommodate the wide variety of bibliographic descriptions necessary.⁽¹⁰³⁾ Thus the regular weekly service of the MARC tape distribution started from November 1966.

The experimental project came to an end in June 1968 and was followed by the establishment of a permanent subscription service embodying modifications in format, etc. (MARC), based on the findings of the experiments. By subscribing to this service, it is now possible to acquire in machine-readable form cataloguing data for American publications, and increasingly, for foreign publications acquired under the Shared Cataloguing Programme.

MARC II

The experiences gained by the Library of Congress and participating libraries were much encouraging. By June 1967, it was felt that the MARC Pilot Project served a useful purpose, and the implementation of the project was feasible. As a result of the pilot studies a MARC II format was developed and introduced in the late sixties. It has been accepted as the standard bibliographic format for cataloguing description in the United States as well as in several other countries.⁽¹⁰⁴⁾

During last the experiment period from June 1967 to June 1968, the LC was engaged in redesigning the procedures and programmes for the MARC Description Service in the MARC II format. A guide to the MARC Distribution Service was published in August 1968 for use and guidance. In march 1969, the operational

102. MARC Development Office. Information on the MARC System. Washington, DC: Library of Congress, 1974. p.1.

103. Rice, James. *op.cit.*

104. Hayes, Robert M and Becker, Joseph. *op.cit.*

system of the MARC Distribution Service covered all English language monographs, catalogued by LC, including the titles acquired through National Programme for Acquisitions and Cataloguing (NPAC). The service was weekly, and approximately 1000 records appeared on each MARC II tape.

MARC II system was designed at the initial stage to operate in batch mode composed of four subsystems input, file maintenance, retrieval and output. The magnetic disc was used as the storage medium for MARC II files. The medium takes less time for input. In designing the MARC II programmes, emphasis was given on generalized and flexible data in independent system, so that it would be an efficient means of communicating bibliographic description of all forms of library materials. The first MARC II format was for books. The LC prepared formats for other types of materials. The MARC II formats for serials and maps were prepared in 1970, films trips in 1971, and for manuscripts in 1973. The music and sound recording formats were prepared in 1975.

UNIMARC

The IFLA Working Group on Content Designator formed in 1973 under the joint auspices of the committee on Cataloguing on Mechanization took steps to establish what is called UNIMARC, which could facilitate translation of records and international exchange of data. The first preliminary draft was discussed in Paris in October 1975, the second draft in Brussels in April 1976 universal use. Finally , for international exchange of MARC records, a new machine-readable format was and is known as *UNIMARC*. It has been envisaged that the national organizations producing MARC records will produce them in the national standards for use within the country and will reformat them according to the UNIMARC format for international exchange. The international and universal MARC has become a reality.

The implementation of *USMARC*, *UKMARC*, and *ISBD*, the increasing number of national MARC formats etc. created an environment for international cooperation in inter-changing a bibliographic data. The IFLA working group discussed some of the problems encountered in the area of universal standardization and agreement on content designators in Machine-Readable format. The concept of SUPER MARC as an international system for exchange of information was agreed up on in principle. The British National Bibliography (BNB) developed a close contact with Library of Congress and took part in designing the MARC II format. The BNB evinced interest in the UK MARC Pilot Project in the UK Office of Scientific and Technical Information (OSTI) also supported the UK Machine-Readable bibliographic record MARC formats have also been developed in countries like Canada, Latin America, Spain, Denmark, Australia, Japan, German, France, Belgium, Switzerland. The multiplicity of these formats makes it difficult to exchange machine-readable data on an international scale. Hence, representatives from France, Belgium, the Netherlands, Switzerland, and UK met together and developed what is now known as *INTERMARC*.

COVERAGE IN MARC

The production of cataloguing data in machine-readable form, which libraries can then search directly or use as a basis for the creation of conventional forms of catalogues and bibliographies.⁽¹⁰⁵⁾ In the MARC format, each piece of information about the item is in a separate space called a field. Each has a number or letter, called a tag, which titles the computer how manipulate the piece of information within the field are subfields, which are coded, usually by letters. The programme instructs the computer what to do with each field and subfield to store the record,

105. Needham, CD. *op.cit.* p.347.

to make it accessible, and to generate products. For example, in MARC record, an author's name is in a field of its own. The field includes subfields as stated below:⁽¹⁰⁶⁾

Field	Tag	Subfield	Element Example
Author	110 10	# a	Surname, Forename (<i>Churchill, Winston Sir 1874-1965</i>)
		# b	Title of address
		# c	Dates

Fig.-5: Elements of MARC entry

MARC tells the computer to arrange the name in this order: surname, forename, title, dates. The computer recognizes the tag for the author field and the codes for the subfields and displays the name like this:

Churchill, Winston, Sir, 1874-1965.

(The programme also instructs the computer to add a period after the second date)

A bibliographic utility provides many cataloguing services to libraries: storage of machine-readable records, catalogue cards, labels, magnetic tapes, printed catalogues, and lists. Cataloguing includes the following steps:

Cataloguing: On-line with a computer in the library

An on-line catalogue is a fully interactive catalogue of holdings that has the potential of being accessible in any number of ways. It is by far the most dynamic form of the catalogue because the user does not need to adapt to any physical limitations (e.g. dictionary listing, divided catalogue, etc.). Users simply input a query such as an authors' name, subject headings, or keyword from the title, and the computer responds with an answer that allows for further communication. Initially, on-line catalogues are used almost entirely for internal catalogue maintenance, but with early on-line catalogues, user-friendliness was not a primary consideration

106. Tracy, Joan I. *op.cit.* p.75.

compared with others (e.g. quality control, updating, and holdings statement). As on-line catalogues continue to evolve, however, users access to them is becoming more important.

Cataloguing: On-line with local database

Sometimes vendors supply a database programme that can be stored in computer in the library (or a nearby library, or a cooperative system). The database includes MARC records from the Library of Congress and may also include records from the other libraries. The database may be stored in a set of floppy disks, on a hard disk or on magnetic tape.

Cataloguing: With a computer

In any library (or for small collections with a larger library), one can create cataloguing records on the library's microcomputer. In such a case, one needs two disks for the microcomputer: a software disk that contains the cataloguing programme and a data disk on which the librarian will enter the cataloguing records for his library.

Microcomputer: Applications for cataloguing

Even without cataloguing software, a microcomputer can aid in cataloguing in a small library. Here are examples of microcomputer applications, using word processing or database management software.

Off-line: By ordering products from a supplier

Now-a-days, a vendor often supplies printed products with the materials that the library orders. The products include catalogue cards and labels to attach to the item: spine label, labels for the books for cards and pockets, etc. The library may

have a choice of how the cards and other products are formatted. There are another type of vendors, who may supply a list of the bibliographic records in its database, probably on microfiche to save space.

CIRCULATION SYSTEM

Circulation is operation concerned. So it has been one of the areas naturally thought of as highly amenable to automation. The circulation system is probably one of the most popular candidates for automation, consisting, as it does, of so much routine. The basic requirements of a circulation system is required to record items on loan and to whom, to find and trap items requested by other users, and to indicate overdue items. Control of the daily movement of thousands of books and other library materials, each of which is a distinctive unit, is a complex matter. Each item must return to its place in exact relation to other items on the shelf. As the total collection expands day by day, the actual physical spot to which a book must be returned cannot not be assured.⁽¹⁰⁷⁾ Circulation systems must also provide messages appropriate to the operation, which will indicate errors, warn of overdue or reserved items, etc.⁽¹⁰⁸⁾

The Circulation includes the following activities:

a. Maintaining files of user's name, addressees, and other information; b. Maintaining files to show which materials are checked out to which users; c. Sending reminders (overdue notice) to users who fail to return materials on time; d. Collecting fines for overdue materials; and e. Accepting requests (holds or reserve) for title in demand.

107. Heilinger, Edward M and Henderson, Paul B. *op.cit.* p.87.

108. Burton, Paul and Petrie, JH. *Information management technology*. London: Chapman and Hall, 1991. p.117.

By automating circulation, a library not only eliminates large files of cards but also improves control over its materials because, in most automated circulation systems, the status of each item can be checked out whether overdue, held (requested), or at the binding, etc.

STEPS IN CIRCULATION:

STEP	ACTIVITIES
Register	- Obtain information from users: name, address, telephone numbers, other information - Issuing borrower's cards to users - Maintain a file of user data and - Change data as necessary: change of address, change of status, other changes - Renew borrower's cards
Checked out	- Change status of an item from "on shelf" to "checked out" - Link the user to the item which it checked out
Checked in	- Change status of the item from "checked out" to "on shelf" - Remove link between the item and the user
Send overdue notice	- Send a reminder to a user who does not return an item on time
Account for fines and charge	- Maintain a financial record for each user who owes a fine for an overdue item/or charges for lost or damaged materials - Account for money received from fines and charges that are paid
Place a hold	- Attach a user's machine-readable symbol to an item that is checked out so that the user can check it out next or be added to a queue
Answer to questions	- Answer to questions about the status of an item: on shelf, checked out, at bindery lost, in another status - Answer to question about a user record: overdue, fines and charges renewal of card, etc.
Compile statistics	- Compile statistics: For Users: Number registered by type, census tract, etc. For Items: Number in system, by type, subject, location, etc. System : Items circulated, by user and item types Transactions, by terminal, by time period, etc.
Make reports	- Prepare reports on circulation department activity at regular intervals.
Maintain liaison with other departments in the library	- Route items needing mending or binding to the processing unit - Refer problem items to the cataloging department - Report lost items to the cataloging department for removal of bibliographic records from the catalogues - Report lost and in-demand items to the acquisitions department for possible replacement or added copies.

Fig.-6: Elements of automated circulation systems

In an automated circulation system, the procedures used by the computers and other technologies to carry out circulation tasks, are called functions.⁽¹⁰⁹⁾ One selects a function from a menu for the task he wishes to perform, check out or check in an item, place a fine, clear a fine record, and so on. He may need to change functions while he is serving a user at the circulation desk, for example, to check out a book and then to collect a fine. Several systems were used since 1900, especially in the western countries, with considerable successes. A few of them are Dickman book charging system, Gaylord system, Newark charging system, Browning charging system, Photographic system, etc. Most popular and efficient mechanized circulation systems, which were installed in some of the US libraries in the early 1930s, used McBee punched cards.⁽¹¹⁰⁾ In this system, the McBee card was filled out with the author's name, title, call number of the book, the user's name and address and then punched along the edge depending on the due date. This is thus clipped off over to the hole representing specific date on which that particular charge is due. To find out those books that are due on particular date, one has to insert a needle through the hole which represents that date and lift the McBee cards. Those cards which refer to the books due, will fall. The card file is usually arranged by the call number. So, the librarian can have an access to the file of McBee cards either by the due date or by the call number.⁽¹¹¹⁾

Though punch card systems have been in vogue since the 1930s, automated circulation gained popularity with the introduction of IBM 357 terminals to read 80 column cards and badges in the 1950s in the USA.⁽¹¹²⁾ A few librarians attempted to use computer-generated lists and unit record equipment. In the late

109. Tracy, Joan I. *op.cit.* p.108.

110. Rao, IK Ravichandra. *Automation systems for acquisition and circulation. In: National policy for university libraries in India*, ed.by NB Inamdar and LS Ramaiah. New Delhi: Concept Publishing, 1989. p.219.

111. *Ibid.*

112. Kumar, PSG. *op.cit.* p.174.

1950s, 1960s and earlier the 1st and 2nd generation computers were installed for automating their circulation systems.⁽¹¹³⁾ During this time Off-line systems were very popular in the field of librarianship. The rise of the 3rd generation computers made it possible for many of the libraries to take advantage of on-line circulation systems in the early 1970s.⁽¹¹⁴⁾

Exception: The system displays on those items that are not in their usual location.

Inventory: The system displays the status of every item in the system: on shelf, checked out, at the binding, lost, in another status, etc.

An automated system operates in an on-line or an off-line:⁽¹¹⁵⁾ “In a small library, the automated circulation system can operate on a microcomputer. In a large library, with many units or branches, there may be dozens of terminals connected by cables or telephone lines to a mainframe computer or a minicomputer. There will be at least one terminal at circulation desk in each branch, as well as terminals at other places in technical and general services”.⁽¹¹⁶⁾

Off-Line Systems

Off-line: Data are held in the computer and processed at an assigned time. Off-line systems are usually dominated by a system called the IBM-357 system. The machine accepts an 80 column⁽¹¹⁷⁾ punched card (end wise) in one slot and a plastic borrower's card punched with standard rectangular holes in another slot. For the system to work, borrowers must, therefore, be issued such cards and the book must have punched cards in them. The information from each of these cards is read automatically and transmitted by cable to a remotely located automatic paper punch

113. Rao, IK Ravichandra. *op.cit.*

114. Kumar, PSG. *op.cit.*

115. Tracy, Joan I. *op.cit.*

116. *Ibid.*

117. Sanders, Donald H. *Computers today*. 2nd edn. New York: McGraw-Hill Book, 1985. p.139.

or recorded directly on magnetic tape cassette. Information on the loan (the period or date) is transmitted at the same time. This record is finally processed at some specific time (as to the needs and decision of the library).

On-Line Systems

On-line : Data are instantly transmitted to the computer from another source and processed immediately. In on-line system the details of transactions are entered through a terminal connected to computer directly. One can obtain up-to-the-minute information from terminal. On-line systems, which began to be implemented in the early 1970s have one important advantages over the IBM-357 type off-line systems. The libraries are now adopting a hybrid approach, wherein, a minicomputer is pressed into services for on-line facilities and a mainframe computer of the parent authority is used for batch processing facilities.⁽¹¹⁸⁾

According to Rao the present day automated circulation systems usually perform some or all of the following functions.⁽¹¹⁹⁾

- Provision of information on the location of circulation items-either all items or only those items on loan or else where, i.e. at the bindery, on reserve, being recatalogued, etc.
- Identification of items on loan to a particular borrower or class of borrowers (namely, off-campus users).ii. Recording of *holds or personal reserves* for items on loan but desired by *another borrowers*, often with additional provision for notifying the library staff when the item is returned and printing a *book available notice* for mailing to the person who requested the item.
- Printing recall notice for items on long-term loan.
- Renewal of loans.

118. Rao, IK Ravicahndra. *Library automation etc. DRTC Refresher Seminar, Bangalore, 1983. See also: Kumar, PSG. op.cit. p.175.*

119. *Ibid.* p.220.

- Notification to the library staff on overdue items and printing of overdue notices.
- Notification to the library staff or problem borrowers (i.e. those with unpaid fines, or overdue books) either at the time of an attempted loan, or at the time a borrower is leaving the institution or on request from the library.
- Calculation of fines, printing of notices, recording receipt of fines, and sometimes printing of the fine receipts.
- Calculation and printing of statistics of various types.
- Analysis of both summary statistics and statistics for the circulation of particular items for use in acquisitions, planning of service and other administrative purposes.
- Provision for handling categories of borrowers and special types of materials.
- Provision for printing due date slips, automatically generating orders for lost books or needed (additional) copies and printing mailing labels for remote borrowers.

These twelve functions are obviously in addition to the primary functions of the systems; the primary functions are charging and discharging books. According to CD Gull⁽¹²⁰⁾ circulation work has, therefore, automated which shows a sentiency to emphasize the service aspects without reducing circulation control. There are eight major operations performed in circulation work as described by CD Gull in the bellow:

- i. Provision of information services to borrowers
- ii. Control of borrowers or users
- iii. Control of materials
- iv. Control of records
- v. Fines accounting
- vii. Control of the time of loans
- vi. Gathering effective use records
- viii. Regular routing of periodicals issues.

120. Gull, CD. Automated circulation systems. In: Library, ed. by Stephen R. Salmon. Washington, DC: American Library Association, 1970. p.139-44.

Machine Readable Symbols

Every circulating item in the library and every person who borrows materials must be assigned a machine-readable symbol. The symbol is called machine-readable because the computer can recognize, accept, and manipulate the symbol. Two kinds of symbols are used in automated circulation system (see *Fig.-7* and *Fig.-8*), one will find one type of machine-readable symbol attached to items and to borrowers' cards:

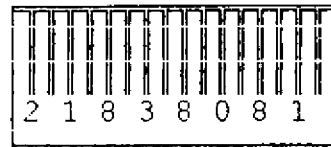


Fig. -7: Bar code (also called zebra label) for circulation

Scanner

Scanning means to pass a beam of light over the bar code or OCR (*Fig. 8*). The beam of light "reads" the symbol so that the terminal can send it to the computer and the computer can accept it.

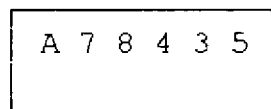


Fig. 8: OCR (Optical Character Recognition Symbol) for circulation

The scanner may be held in the hand and be shaped like a pencil or like a pistol. Another type of scanner is placed under a pane of glass set into a counter so that the bar code or OCR is passed over it.

Methods of Data Inputting

The simplicity of an automated circulation system depends upon how best one can capture both the document and user identification numbers at the circulation desk at the time of charging or discharging a document. There are several ways of capturing the identification numbers. Some of these are discussed below:⁽¹²¹⁾

Document Identification Number

In an automated circulation system, each document usually carries a punched card with a minimum required information for identifying the document. The minimum required information about a document is:

A. Bibliographic Data

- i. Document Identification Number (Bar code, OCR, Call number, Accession number, ISBN, ISSN, etc.)
- ii. Author
- iii. Title
- iv. Added entries
- v. Subject headings
- vi. Edition, if any
- vii. Volume number, if any
- viii. Year of publication
- ix. Name of publisher
- x. Place of publication
- xi. Control number in database.

B. Copy Level Data

Item type	: Book, film, sound recording, kit, etc.
Usual location	: Stack, reference, rare section, librarian's office, etc.
Other categories	: Juvenile or adult material, special collection, etc.
Price	: Taka or US \$, etc.

The copy level data also includes the status of the item once it enters the system:

On shelf (available for check-out);
 Check-out;
 Overdue;
 On held;
 Lost or missing; and In another status: at bindery, or in transit, etc. are also entering data into the database of the system

121. McBee, Rob. *Key factors of circulation system: analysis and design*. College Research Library, March 1972 : 127-39.

C. Borrower's data

For each person borrowing materials and for each item to be circulated, data must be linked to the machine-readable systems assigned to that person or item:

Name	: <i>Last name, first name, middle name or initial</i>
Address	: <i>Holding number, Street, City, Zip code with post office,</i>
Social	<i>security number (if any)</i>
Type of users	: <i>Adult or child, etc.</i>
Information for statistical purposes	: <i>Age, sex, occupation, and other related data</i>

REFERENCE SERVICE

After the turn of the century, and with the rapid growth of reference work, certain accepted objectives were formulated as well as with needs of the clientele. A reference librarian helped and instructed to use the library with technologies, took an active hand in building adequate collections, and meanwhile, answered questions more precisely. Reference services are nowadays computerized; the term computerized reference services, once synonymous with outline searching of external databases, now encompass a much broader range of activities.⁽¹²²⁾ New Technologies are being used for: 1. maintaining reference collection; 2. preparing translation of technical materials; 3. answering reference queries; 4. preparing bibliographies, current awareness for patrons; 5. performing comprehensive literary searches on requests; 6. maintaining files on various aspects for ready references, etc.

122. Rothstein, Samuel. Development of reference services through academic traditions, public library practice and special librarianship. Chicago: ALA, 1955. ACRL monograph no.14. p.4.

Methods to organize Reference Service with use of new technology:

1. As a file clerk, the computer has had wide application in the reference services
2. The query may be posed or answered on the telephone
3. Videotex, the use of the telephone and television set for information retrieval-now available in a large number of libraries and reference services
4. Teletex, a more recent development aimed at delivering information
5. Telex is very effective to receive the query and to deliver answers as well.
6. Facsimile (Fax) is a very fascinating technology in reference services to cope with the day-to-day queries
7. As a both-way medium, post is an effective instrument. The user may send a letter and seek information through post
8. On-line database searching has created and made available to the public through bibliographic utilities (e.g. OCLC, RLIN, WLN, UTLA, etc.) as well as commercial search services.

CLASSIFICATION

Classification of document involves three distinct major processes. The first two process of defining a structure of subject or groups and determining a basis for the classification , while the third process of classifying documents into groups. Computer programmes perform the second and third processes. The first set of programmes attempts to find a pattern among the document and them select and weigh a subject of words to form a basis for the classification. These programmes are used only when the system is initiated or revised, whereas the second set of programmes are used periodically to classify new documents.⁽¹²³⁾ Several attempts are being made to classify the document with new technologies and it is desirable that the coding should be done by using classificatory language.

123. Williams, JH. Computer classification of documents. In: K. Samuelson, ed. Mechanized information storage, retrieval and dissemination. p.235-46. *Quoted from:* Kumar, PSG. Computerization in Indian libraries. Delhi: BR Publishing, 1987. p.136.

The increase of subjects made the need for the discipline of classification felt. It was found to be more convenient to translate the name of a subject first into classificatory language and then translate the class number into machine language.

Analysis of the name of subjects into its basic and isolate terms was found necessary. Neelamegham and Venkataraman conducted experiments in India in 1968 on the synthesis of class number by computer in which kernel terms expressing a subject in the natural language are given.⁽¹²⁴⁾ For this study the Colon Classification (cc) of Ranganathan was used. This study was divided into the following phases.⁽¹²⁵⁾ 1. Preparation of the CC scheme on tape; 2. Reading in Kernel terms; 3. Distribution of Kernel terms; 4. Synthesising the class number; and 5. Printing out the class number.

Dr. Ranganathan stressed two purposes of computer use.:

1. Locating in a store of entries, those relevant to a specific subject.
2. Producing copies of entries and/or abstract of the respective document. The facet is very helpful:
 - a. Spotting out and making of basic subject and isolates; b. Feeding into the memory of machine each of those basic classes and isolates; c. Programming; and d. Retranslating from the machine language to natural language.

Coding in machine language consists of the following steps:⁽¹²⁶⁾

1. The machine has to be fed with all the facts of a subject of search at the stage of storage of entries. The isolates should be precise.

124. Neelamegham, A and Venkataraman, S. *Use of Computer for the synthesis of class number: a case study with a freely faceted version of colon classification*. *Library Science*, Dec 1968; 5(5): 359-89. *Quoted from*: Kumar, PSG. *op.cit.* p.136-37.

125. Sharma, CK, and Arya, SB. *Documentation information science and automation in libraries*. Agra: YK Publishers, 1988. p. 221.

126. Freeman, RR and Artherlon, P. *File organisation and search strategy using UDC in mechanised reference retrieval system*. *Quoted In*: Kumar, PSG. *op.cit.* p.138.

2. At the stage of programming as the machine has to be fed the same. The facet analysis if the two stages should be consistent with each other. The coding should be done from classificatory language. The connective symbols are also to be introduced to machine and also rounds and levels of a facet.

According to Parthasarthy the use of faceted classification is recommended for machine coding. Both machine coding and faceted classification are concerned with organisation of recorded thought, its structure, development and systematisation, but purpose is different. Further, to retrieve information the approach is from subject heading- code- machine. Alphabetical approach can not indicate subject relationship and a prepare approach is not possible. This is only through a structural and faceted class number(s). The subject heading derived from class number by the technique of chain procedure, he provides, with code number(s) used for machine searching. By this procedure, the class number entry will give appropriate a code number to be used for machine e.g. subject heading class numbers, code number-machines.

According to DJ Foskett the faceted classification can be of immense help to both manual as well as the mechanical information retrieval. Modern methods of making class schemes with their highly efficient devices for expressing not only the parts of a complex subject but also the inter-relations between them are equally suitable both for traditional library use on shelves and in catalogues and for selection by mechanical and electronic equipment.

According to Swanson and system can be used to provide automatic classification and indexing, but it depends more than a title alone. He adds that machine readable input should be as follows: 1. All the words of the title, sub title; 2. Table

of contents; 3. Index; 4. A listed subject headings; 5. If necessary introductory paragraph; and 6. A short indicative abstract would be useful.

Processing

If the machine is fed with a list of words for each heading with the synonymous or characteristic of that subject heading. It could achieve considerably a more published and even impressive results. There should be separate thesaurus for each subject. However, the human intellect is no doubt, involved in preparation of such a fine subject heading list and the programme.

In Informational searching Retrieval

UDC and Coding

Experiments were done in USA on the use of Universal Decimal Classification (UDC) in mechanised reference retrieval systems. A report on these experiments was presented by Freeman and Artherton in their paper presented at the FID/IFIP joint conference held in Rome in 1967.⁽¹²⁷⁾ The authors discussed how UDC might be used as a query language in a typical retrieval system in which the user interacts directly with the computer stored document reference file.

Use of Computer with Colon Classification, UDC and DDC

A system was suggested by Dr. SR Ranganathan wherein a catalogue on tape would consist of a class number for the input document and specification of host kernel terms fed in random sequence, but expressed in standard terms used in the

127. Ranganathan, SR. *Docfinder*. *Library Science*, Dec 1968; 5(4): 298.

128. *The Kernel terms, in random sequence, with the bibliographical specification of the host document are punched on cards and read by the machine. The machine compares each of the basic class terms and isolate terms with each of the kernel terms fed in starting from the beginning of the schedule. The machine will scan the various kernel terms in the schedule in the facet sequence. Whenever there is a match, it will pick up the numbers against the term along with the prefixed connecting digit. The first term to be translated is always the basic class. It has no prefixed connecting term digit. The machine successively scans the schedule until the corresponding isolate number for all the kernel terms have been picked up and assembled to form the class number. Special programmes have been prepared to represent the devices isolated in CC class number.*

schedule. Query of the reader will be facet analysed and Kernel⁽¹²⁹⁾ terms fed into the computer. The computer will synthesise the class member for the query. Search in the catalogue on tape on the basis the query, select and print the relevant entries on the basis of a match. Recently some investigations were made in an Indian school of thought at Documentation research and training centre (DRTC), Bangalore on automatic classification. DRTC is hopeful for better result.⁽¹³⁰⁾

The Tata Institute of Fundamental Research (TIFR) library is maintaining a computerised classified catalogue where the entries are arranged according to the UDC scheme. The class number is being used for on line search.

North South University library of Bangladesh is maintaining a computerised classified catalogue since January, 1995. The entries are made according to the Dewey Decimal Classification (DDC) scheme with the micro CD/ISIS. Searching facilities are also available with DDC.

Index

Index is a retrieval tool. It provides various access points through which a user can identify the document or select of his interest. According to British Standard Institute (BSI)⁽¹³¹⁾ an index is:

"a systematic guide to the text of any reading matter or to the contents of other collected documentary material, comprising a series of entries, with headings arranged in alphabetical or other chosen order, and with references to show where each item indexed is located."

A similar definition of index has been given by Bonn.⁽¹³²⁾

An index is a detailed alphabetical list of names. Terms, topics, places, formulae, numbers or other significant items in a completed work. (Such as book, set, or bound journal) with exact page references to material discussed in that work.

129. British standard institute. Recommendation for the preparation of indexes books. Periodicals, and other publications. London: BSI, 1964 (BS 30: 1964). p.6.

130. Bonn, George S. Literature of science and technology *In*: McGraw-Hill encyclopedia of science and technology. New York: McGraw-Hill, 1971. V.7: 613-14.

131. Kumar, PSG. *op.cit.* p.156.

132. Bonn, George S. *op.cit.*

As defined by Vickery:⁽¹³³⁾

an index is a working tool designed to help the user to find his way about the mass of documented information in a given subject field.

Thus, an index is a list arranged systematically, providing enough detail about each item so that it can be identified and traced. It may be published separately or form part of another work. Usually, an index is arranged alphabetically but may sometimes be arranged chronologically, geographically, numerically or in any other suitable manner, depending upon the needs of arrangement.

Therefore indexing means a process of making such an index. Indexing is a technique or a complex of techniques of preparing index. Indexing is a method of document representation, the ultimate aim of which is to provide access to the users through the descriptions used. Some times it is difficult to represent a document in a single term. In such a case, more than one form have to be used. There index terms are arranged in a more searchable order. This ordering involves a definite syntax, semantics and orthography. Because of these characteristics, indexing is described as a language, more so, an artificial language. The indexing language may be available in a prepared form for adoption in any information retrieval system or the language may have to be specially designed for a system. A scheme of classification is a ready made language. Vickery suggested that there are several method of indexing which can be used with case and effectively.⁽¹³⁴⁾

"Correlative methods of indexing using compound headings, faceted classification, chain indexing are subtle and flexible as most machine and coding. In retrieval he lays stress upon the subject analysis and coding. Mechanisation can aid information storage but selective retrieval depends on precise subject analysis and coding."

133. Guha, B. Documentation and information: services, techniques and systems. Calcutta: World Press, 1978. p.165-166.

134. Tedd, L.A. Introduction to computer-based library system. London: Heyden, 1977. p.127.

Pre-coordinate

In a pre-coordinate system the compound or corporate subject is analysed into its constituent concepts according to a plan and these constituent concepts are represented in a particular pattern of coordination of terms. In such a coordinated string of concepts there are many access points. In order to satisfy the various approaches of user, many of the systems have involved patterns of rotation, cycling, shunting, etc. of the terms.

Some important pre-coordinate systems are:⁽¹³⁵⁾

- i. **Kaiser's Systematic Indexing**
- ii. **Ranganathan's Chain Indexing**
- iii. **Farrandane's relational analysis**
- iv. **Coat's BTI Indexing**
- v. **POstulate-based Permuted Subject Indexing (POPSI)**
- vi. **Sharp's SLIC (Selective Listing In Combination) and**
- vi. **Derek Austine's PRECIS (Preserved Context Index System)**

Post-Coordinated Systems

Dissatisfaction with the pre-coordinated indexes have led people to devise post-coordinated systems which eliminate pre-coordinating of the concepts, etc. In a post-coordinated system, the concepts will be kept separately and these can be coordinated by the user at the time of search.. Professor B. Guha⁽¹³⁶⁾ enumerates that the *coordination of concepts could be done at the time of search. The indexing systems which are based on basic principles are collectively called post-coordinate index. It should be noted that the process of coordination is there in both the systems. Only they are done at two different stages.*

135. Bose, H and Dutta, S. *Keyword indexing for the Indian Science Abstracts*. *Annal of Library Science and Documentation*, 1967, 14(3):122-32.

136. Guha, B. *op.cit.*

Following are the post-coordinate systems:

- i. Mortimer Taube's Uniterm System
- ii. The Batten System
- iii. Zator System of Calvin Mooers
- iv. Selecto System of Cordonnier

Title Based Key Word Index

The use of computers in the field of indexing has increased with the pioneering of Luhn of IBM on the Key Word In Context (KWIC) index. Since then a number of various of KWIC index like Key Word Out of Context (KWOC), Key Word Away from Context (KWAC), etc.

Other Indexes

The other general indexes are: 1. Indexes to books (i.e. back-of-the-book indexes)
(i) Relative index (of DDC) (ii) Alphabetical index (of LC) (iii) Permuted index (of UDC) 2. Citation indexes.

Automatic Indexing

Statistical Analysis of the Text

Automatic indexing and classification systems depend on the availability of the entire text of the document in machine readable form. The indexing is then achieved by carrying out statistical analysis of the text. Such analyses are based on word frequencies. Weights (or numbers) are then allocated to the words according to the result of the analysis. These weights are used when searching for relevant documents.⁽¹³⁷⁾

137. Tedd, L.A. *op.cit.*

String Manipulation

The subject of a document is represented by a string of descriptors in a sentence-like manner and the string is manipulated to generate a series of index entries. The descriptors are selected and structured into a string by the indicators. The string of pre-coordinated concepts forms the input to a computer to generate all the index entries.

Keyword Indexes

Keyword indexes are the simple and most widely used forms of machine generated indexes. They are of different Kinds:

- (i) KWIC (Key Word in Context);
- (ii) KWOC (Key Word Out of Context);
- (iii) KWUC (Key Word and Context);
- (iv) KWUC (Key Word and UDC)
- (v) WADEX (Word and Author Index); etc.

In these indexes an entry is recorded under each Keyword in the title. The difference between KWIC, KWOC, KWAC, etc. is more with respect to format. There is hardly any difference as far as indexing technique is concerned. As these indexes are title based, one has to ascertain as to how far the title is indicative of the contents of the document. In some cases an author prefers to give a catchy, fanciful title to his document over an expressive, concept based title. Before initiating the program of indexing, all such fanciful titles have to be isolated and replaced by expressive titles. This is the major hurdle in the complete mechanisation of keyword indexes. When the titles are fed to the computer, it must be told as to how to derive the keywords. There are three ways in which this can be done.⁽¹³⁸⁾

138. Raizada, AS, ... etal. *Preparation of indexes*. *Annals of Library Science and Documentation*, Sept 1969; 16(4). p.140-2.

- A. Stop-list: In this a list of words which are not required as keywords is given to the computer. A program compares each word in the title with each word in the stop-list. When no match occurs, that word is assumed to be a keyword.
- B. Go-list : This is the opposite of a stop-list. In this the computer is given a list to words which will be required as keywords. A program compares each word in the title with each word in the go-list and if there is a match then it is taken as a keyword.
- C. Manual Tagging: The words that are required as keywords are tagged in some manner manually at the input stage. As this involves human decision. The resultant index is always better than the one produced by the above two ways.

Technique of Indexing

On account of the selection involved in indexing the technique and the art of indexing are important. Which involves: 1. Reading the document which may be a line, a para a page, a section, or a chapter of a document. 2. Selecting an index term on some basis. It is here, that human ingenuity, skill, art and expertise are called for mainly on account of vague, undefined ambiguous rules for the selection of indexing terms. 3. Recording the selected terms on suitable media according to available rules of grammar. These rules too are ambiguous, thereby raising the problem of decision. 4. Fitting the index term with its address and recording on the same. The address may be the line number, paragraph number, section number, page number of chapter number in a document. 5. Ascertaining that all the documents have been completely scanned. 6. Sequencing these recorded items in the desired sequence which may be alphabetical (for names of persons, places or things) or numerical (for numbers) or special (for class numbers etc.). 7. Editing

the sequenced terms to suit the dissemination requirements like appearance, column width, etc. This may involve operations like merging.

In Bangladesh, no such considerable works have yet done. BARC, BANSDOC, ICDDR,B has initiated in their areas by computerising Key Words and alphabetical indexes to authors and respective subjects of their interests. The reasons for this switch from manual to computerised form is to avoid the inadvertent delay in compilation and publication of these indexes which was jeopardising the publication schedule. About 7 (Seven) institutions including North South University Library, Ain-O-Shalish Kendra, DISC (ICDDR,B), SAARC Agricultural Information Centre (SAIC), Community Development Library, etc. have programmed for KWIC indexing. Thus, KWIC indexing is commonly adopted computerised indexing. In Bangladesh, work has been done in statistical analysis of the text and in title based indexing.

IMPACT OF NEW TECHNOLOGY

CHAPTER SIX

IMPACT OF NEW TECHNOLOGY

"Library is a social organism" and its development in all wings of social life results in the mass production of literature which causes a complex problem to some of the researchers. New technologies have affected many fields, including information systems and services as well. The application of new technologies, especially computer, was first thought in the fifties of the current centuries when documentation work was started. In the sixties some efforts were made in this field with an experiment of push button library and information services. Information and documentation system will revolutionize elementary social relations, such as relations between the producer and the consumers, the citizen and the states, the workers and the employers.

The past decade has reexamined and revised most social institutions worldwide. Some have been rejected. Cultural and social norms are questioned almost daily in printed and electronic media. In short, this is an era of stressful change brought on by convulsive waves of shifting values on every front. Changes are not new to libraries and information services, but what is new is the collapsed time-scale of changes. In the past, change was faced as it happened, but lately social and technological alternatives have occurred at so great a rate that change must be dealt with continuously. The order of change is entirely different from anything that came before. Whether one calls this change

revolutionary or evolutionary hardly matters; what counts is the degree to which such changes will affect the library's role in the society. As one librarian put it recently, "the trouble with our times is that the future is not what it used to be".

The social institution called the library is in the middle of an onslaught. Rising costs of everything are eroding a traditionally secure financial base. The new technologies: audio-visual materials, microfilm, and computer-based communications media, are in competition with the printed book. Information is being generated faster than libraries are able to organize and store it.

Commercial companies are getting into the information business. Databases are replacing card catalogues. Communication channels are distributing information more widely. In fact, the pace of technological change brought on by developments in computers and communication systems has increased so rapidly that it is difficult to comprehend, much less to measure, the potential impact of such change in library services and operations. One thing is clear, however, the rate of change in libraries today will undoubtedly be altered during the coming decade in fundamental ways while it is not possible to predict exactly what the library of the future may be like. The principal forces of change can be examined and from this an attempt may be made to discern some trends.

New technology concerns the uses of systems that allow the transfers, storage, processing and presentation of information; its aim should be the benefit of society and its individual members. In that computers are information processors and very efficient devices for controlling information storage and transfers, it is a fair claim that new technology as we know it depends mainly on them. It is also a fair claim that society as we know it in the First and Second Worlds at least, depends on information for its efficient running.

New technology has never been an invention looking for an application; its progress has always been led by demand, in that people have at all times been able to ask 'wouldn't it be nice if we could ...'.⁽¹⁾ One force of change is economics. Libraries are in an inflationary spiral. The rate of increase in library costs generally exceeds the rate of inflation. How long this will continue no one knows, but libraries are being forced to reduce costs, to examine rather closely what they do, and to determine how they can increase their productivity. Raising productivity through application of new technology has, therefore, become an internal library objective. The application of new technology to business and industry has made many librarians and information scientists feel confident that use of new technology (automation) will work in libraries and information services too. In fact, many librarians and information scientists view application of new technology as the only sensible way to reduce traditionally high labour costs without sacrificing library and information services.

On the other hand, there has been tremendous change in the past decades or so in the financial world. Before new technology became common in the banks, most clients were compelled to spend lengthy periods in queues to cash cheque, carry out transfers or even just to inquire about the status of their accounts. "Transfers could take up to a week or more to pass through the system, and errors were not uncommon. Now the queues in the banks are much reduced by the ubiquitous *hole in the wall*, the 24-hour-a-day Automatic Teller Machine

1. Becker, Joseph. *Libraries, society and technological change*. **Library Trends**, Winter 1978:410.

(ATM)".⁽²⁾ This can provide cash on demand and display current balances, as well as offer more and more other information and services. These have become increasingly popular; cash withdrawals and certain other operations,

(ATM)".⁽²⁾ This can provide cash on demand and display current balances, as well as offer more and more other information and services. These have become increasingly popular; cash withdrawals and certain other operations, such as transfers between accounts at a single bank, can now be done at anytime rather only during banking hours.⁽³⁾ Money transfers now take place much more quickly, and with less risk of error, thus cutting costs in various ways. More and more people and organizations are able to leave a proportion of those transfers entirely to computers; they can buy and sell goods, stocks, shares and currencies automatically ^{and} instantaneously, on the basis of continuously updated details of market prices.⁽⁴⁾

Prestel, the world's first public viewdata service, is a splendid example in new technology, with its tight relationship between computers and telecommunications. Viewdata enables users to interact with its database, e.g. by ordering a product, as well as looking up information.⁽⁵⁾ By linking a computer to the telephone network with a modem, one can rapidly access a huge bank of information interactively. Thus after looking at travel time tables on Prestel, people are able to book seats and holiday packages; they can place hotel and theater bookings in the same way; and can order deliveries of groceries, flowers and other gifts as well as place order to vendor to supply books for the library. Message to Prestel users elsewhere can be sent free, using the system's electronic mail-facility, and to many non-users by linking to the worldwide telex network news, local and world weather, educational, financial and geographical

2. Deeson, Eric. *Managing with information technology*. London: Kogan Page, 1987. p.13.

3. Ernst, Martin L. *Electronics in commerce*. In; Torn, Foster, ed. *The information technology revolution*. Oxford: Basil Blackwell, 1985. p.338.

4. Deeson, Eric. *op.cit.*

data. All these and many more areas of information (as well as games) are available to Prestel users at any time of a day or night at often little more than the cost of a local phone call.

New technology helps public transport to provide a better and more efficient service. It allows management to have a clear, up-to-date picture of the position and status of all their vehicles and to keep in touch with the crew as well. At work, new technology-based information transfers, including word processing, facsimile and electronic mail, can markedly increase efficiency and job satisfaction. At leisure, Prestel-style squash booking, details of entertainment programmes and restaurant menus help people to lead fuller lives. At home, the personal computer is starting to take up an essential role other than for playing games; the home is in transition to a unit integrated into a *global village* rather than being a traditional castle with closed drawbridge. Prestel-style information transfers is linked with cable and satellite television and video phones so much that there is a marked growth in the number of people (tele-commuters) working with new technology.

These few examples should convince anybody, if anyone didn't already agree, that new technology is the basis of our modern society. However, so far the economy is concerned, savings in the library staff and time, through application of new technology, have already been demonstrated. The use of shared computer facilities and the procurement of small, standardized, special-purpose minicomputer systems for-defined library operations, such as book circulation and the control of serial records, are examples of areas in which this has happened.

5. Peltu, Malcolm. *Introducing information systems management*. Oxford: NCC Blackwell, 1982. p.11.

The economic pinch is also felt in the area of acquisitions. At one time libraries sought to acquire large independent collections. Today this objective is regarded as financially impractical. The reason is that the so-called "information explosion" has not abated. Information continues to abound in films, microforms, computer tapes, analog tapes, videotapes as well as in books, journals and technical reports. By 1985, some information scientists predicted a four-to-seven fold increase in the world's output of information.⁽⁶⁾

To cope with rapid explosion of information at present there is the idea of "networks",⁽⁷⁾ wherein libraries form external cooperatives and rely on the new communications technology to help them share resources. Networks imply increased use of the specialized collections of other libraries. Networks also imply a sense of responsibility on the part of each member library to serve more than its own constituency. As we noted earlier, most of the new technologies of communication are simply extension of existing communication media.

Advances in television broadcasting by cable, satellite, and a combination of the two, represent new and powerful capabilities for dissemination of information as images and sound.⁽⁸⁾ One of the greatest benefits which the new communications technology brings to libraries is the ability to interconnect them functionally in a more immediate way than ever before. Electronics can do this. In the past, libraries were doorways to internal collections, but communications technology has the power to convert them into windows on the world's knowledge.⁽⁹⁾

Another significant factor that is causing libraries and information services to change is the force of technology itself. In the last 40 years, for example, the

6. Anderla, George. *Information in 1985: a forecasting study of information needs and resources*. Paris: organization for Economic Cooperation and Development, 1973. p.23.

7. Burkett, Jack. *Library and information networks in the United Kingdom*. London: Aslib, 1979. p.4.

8. Williams, Frederick. *The new communications*. California: Wadsworth Publishing, 1984. p.158-9.

9. Burket, Jack. *op.cit.*

spectacular spread of television, electronic computers and communication satellites has revolutionized the communication systems worldwide. Human's appetite for new means of communication seems insatiable. And no matter how many new technologies are developed, there is reluctance to let go of the old.

Hayes and Becker⁽¹⁰⁾ remarked that "the new technology has already an impact on libraries, especially the computers are being used to track book loans, distribute catalogue data to remote computer terminals, check in periodicals, order publications, produce book and microfilm catalogues by electronic photocomposition, and even pay bills to library suppliers. Other library applications include provision of automatic bibliographies, spotting and claiming missing issues of serials, and maintenance of directories of databases in the libraries. There was time when librarians looked forward to having the library's own computer on the premises, but the computer industry recently made it possible to communicate with a computer from a distance, and this has become the general pattern". Of course, many libraries own or rent computer terminals which are connected to commercial database services by telephone lines and these terminals are routinely used for obtaining answers to information questions. Small computers, called minicomputer, also enable libraries to own their own computer for a particular library function, such as circulation or acquisition.

In addition to the use of computers, libraries have begun to utilize telecommunications technology. A great variety of telecommunication methods have been used for library-to-library communications and for library-to-homes as well as library to-office communications. These range from the simplest use

10. Hayes, Robert M and Becker, Joseph. Handbook of data processing for libraries. 2nd edn. New York: Wiley Becker & Hayes, 1974. p.14.

of telephone to teletype, radio, and cable television, and even to experiments with microwave and satellite telefacsimile transmission. Although the advances of telecommunications have been known to libraries for many years, utilization has been related by problems of cost and systems planning. In the past few years, however, when it became possible to send and receive library computer data over standard telephone lines, interest in telecommunications in general has grown.

Until recently, the idea of tying libraries together through a telecommunications network was considered a costly objective. However, new developments in communications technology, such as fibre optics, packet switching and direct broadcast satellite transmission, reduced communications costs, certain to stimulate greater use of communications by the libraries. As these new arteries of communication connect more and more libraries and information services, the prospect of creating a network of information resources becomes a tangible telecommunications reality. "Continuing advances in computer and communications technology, therefore, are creating a quiet revolution in libraries and information services. It is quiet because the signs of change are subtle and not always evident. It is a revolution because the technology will most surely affect all libraries".⁽¹¹⁾

The new technology does destroy jobs, although they are usually in the less skilled and more mechanical areas. On the other hand, it does create new jobs, obviously in the design, manufacture and servicing of the new areas of opportunity with jobs within them. Examples of new areas that have given rise to jobs include the provision of special list banks of information that can be accessed by telephone, the provision of facilities that allow people to work from

11. Marshall, Gray. *Beginner's guide to information technology*. London: Newnes Technical Book, 1984. p.13.

their homes and to hold conferences using communications equipment so that there is no requirement for them to travel to meet at some common centres, and the writing of software. The last area has provided jobs for many, including a number of young programmers some of whom have earned large amounts of money by writing games programmes for home computers.⁽¹²⁾

If some jobs have been created, it is equally clear that others have been altered substantially by the new technology. Thus, the introduction of word processor does not destroy the need for expert typists since information must still be typed with word processor just as it must with a typewriter. It should preferably be typed as quickly and accurately as possible so as to take full advantage of an expensive word processing system, although the need for accuracy may be relaxed a little when a programme to check that words are spelt correctly.

However, the operator of a word processor needs to master more skills than an ordinary typist in order to learn how to use the extra facilities that it possesses, and so needs more training. In this way the job becomes more highly skilled as a result of the new technology.⁽¹³⁾

However, according to Margaret A. Boden,⁽¹⁴⁾ "social impacts will be of various types. First, there will be effects on individual and institutions brought about by specific application of new technology, such as expert systems for medical diagnosis, legal and financial advice, educational help, and information services". The general public might come to be less dependent on human expert than they are today. Reducing the power of professionals, such as doctors, lawyers, and teachers would certainly have advantages. But replacing human professional advice by

12. *Ibid.*

13. *Ibid.* p.13-14.

computer programmes is dangerous to the extent that new technology-based systems in public use are inadequate and/or ill-understood. Systems that have taken several man-years to develop (and whose original programmes may be retired, or dead) are often very different to evaluate or alter, because even computer scientists do not fully understand how they work. A second type of social impact concerns general social trend brought about by applications of new technology.⁽¹⁵⁾ "These include changes in the proportion of the work force in service and leisure industries, changes in the division of labour and sexual roles, and changes in general life styles and patterns of interactions."⁽¹⁶⁾ For example, males will be increasingly freed to take up jobs in the *Caring* professions (such as nursing, education, and social welfare). This could change the general evaluation of emotionality in the masculine role, an effect that could also be encouraged by men's having increased leisure time to spend with family and friends, such an effect could be liberating and humanizing, leading to a more convivial society than have today".⁽¹⁷⁾

Other potential consequences of new technology point to the opposite direction. The widespread use of home terminals, for instance, threatens to have an isolating influence even more powerful than that of television. If people are encouraged to work, and to shop, from their sitting-rooms, there may be unfortunate psychological effects in terms of personal stress and loneliness. community computer centres could offset these effects to some extent, providing a social meeting place outside the confines of the home and nuclear family. Some writers even predict that commercially available new technology-based systems will be heavily used

14. Boden, Margaret A. *The social impact of thinking machines*. In: *The information technology revolution*, ed. by Tom Foster. Oxford: Basil Blackwell, 1985. p.99.

15. *Ibid*.

16. *Ibid*

17. *Ibid* p.100

not only in task-oriented ways, but as surrogates for human contact. In this view, the strong tendency to anthropomorphism that most of us share will result in patterns of interaction being stewed away from human beings, and toward quasi-human computer systems (with naturalistic "voice", and sometimes even "bodies"). Although such forecasts grossly underestimate the technological difficulties involved in building programme "friends-off-the-shelf", they do suggest that human interactions could be impoverished to some degree in the future.

These contrasting examples^{show} how new technologies will have suitable, and varying, influences in society. Moreover, "new technologies could foster a general view of humanity as either *mechanistic* or *non-mechanistic*, depending on how it is interpreted by public. The commonest interpretation is that new technologies present as *mere machines*, with no free choice for moral responsibility".⁽¹⁸⁾ Since this image of man could have socially pernicious effects, people should be helped to understand that it is fundamentally mistaken.

The economic impacts will be far-reaching. Traditional manufacturing and clerical-administrative jobs will be decimated, but new jobs will be created: some directly connected with new technology (like computer hardware engineers and programmers), others will be made possible because people are freed to devote their time to services (caring professions, education, leisure). Whether there will be enough new jobs to compensate for loss of old ones (as has always happened in the past, at least eventually) is however unclear, for NT can apply potentially to all jobs where personal human contact is not essential. Developing countries like Bangladesh share many concerns regarding the introduction of new technologies. These countries must pursue realistic library and information services policies, which will have no effect on the traditions.

18. McKinley, M. *File management in the automated library*. *Technical Service Quarterly*, Fall/Winter, 1983;1:95-98.

Since the advent of library automation in the 1960s, the environment in which technical services staff carry out their work has been changing drastically. In preautomated technical services, departments and workers clustered in small groups around paper files which they managed and maintained. Many of these librarians took great pride in their files and their ability to extract information from them which was all but invisible to the novice or to the uninitiated.⁽¹⁹⁾ Each technical services unit had its own unique files. Anyone who wished to use those files had to go to or telephone that unit. Once automated, those who selected acquired, and catalogued materials began working with machine-readable files. Workers who typed, arranged, filed, withdrew, refilled, or discarded 3 by 5 inch slips no longer perform these tasks. Instead they communicate with computer-stored files.⁽²⁰⁾

The two technological developments which seem to have had the widest impact to date on technical services in libraries are the growth and development of bibliographic utilities and the more recent development of integrated automated local systems. Bibliographic utilities have prospered in large part because of the role they play in cataloguing. Automation, in the form of bibliographic utilities and MARC format, has revolutionised the practice of cataloguing.⁽²¹⁾ These changes have occurred at a very accelerated rate. Less than twenty years ago, library schools were still teaching professional librarians how to lay out and type a catalogue card and to master the complexities of Library of Congress filing rules. Today's librarians rely on MARC format to provide proper punctuation and

18. *Ibid.*

19. Freedman, MJ. *Automation and the future of technical services*. *Library Journal*, 15 June 1984; 109: 1197-1203.

20. Goodrum, CA. *The library of Congress*. New York: Praeger, 1974. p.90.

21. Mahapatra, Piyush Kanti. *The computer in the library services*. Calcutta: World Press, 1985. p.89 102.

spacing and debate which MARC fields will be indexed in specified automated files. MARC's coverage is very wide, with an international of libraries supplying data.⁽²²⁾

Library catalogues in one form or another have existed as long as library collections. Cataloguing provides physical and intellectual control over individual items. Cataloguing includes the tasks of classifying, describing, and providing access to the materials in a library's collection. Original cataloguing can be a time-consuming task. The library of Congress has estimated that its cataloguers need from three to five hours to catalogue a typical book.⁽²³⁾

The intellectual tasks of describing the physical item, establishing authorised entries, and analysing subject content remains much the same in an automated environment, though these tasks may be performed using Computerized resource tools. Computers have proven useful in handling clerical processes, such as file management, and supporting a variety of products from the machine-readable cataloguing record, from cards to on-line public access catalogues. The ease with which cataloguing records can be shared among many libraries is one of the greatest benefits of library automation. Individual libraries no longer have to catalogue each item for the first time; this can drastically reduce the costs of cataloguing.⁽²⁴⁾

The Library of Congress has always been the largest contributor to shared cataloguing and continues in this role through the distribution of the MARC tapes. The MARC project, begun in 1965 at the Library of Congress, is often considered the most significant development in the history of library automation.⁽²⁵⁾

22. Thompson, James. *The end of libraries*. London: Clive Bingley, 1982. p.44.

23. Goodrum, CA. *op.cit.*

24. Colaianni, Lois Ann. Evaluating online catalogs: the need for data. *In: Impact of online catalogs*, ed.by Joseph R. Methews. New York: Neal-Schuman Publishing, 1986. p.81.

25. Salmon, SR. *Library Automation Systems*. New York: Marcel Dekker, 1975. P.85.

The implementation of MARC made it possible for the Library of Congress to distribute its cataloguing data in standard machine-readable form. Individual libraries, commercial vendors, and bibliographic utilities use these files for a variety of purposes. The bibliographic utilities, in particular, have made the Library of Congress machine-readable cataloguing records available to a large number of libraries who could not afford to mount and maintain the complete MARC tapes locally.

Bibliographic utilities have played a major role in library automation by permitting individual libraries to share the benefits of new technologies without having to bear the full cost of its development and operation. Maruson has pointed out that the bibliographic utilities are true utilities in the realm of library automation. She calls them technological "change agents" in three critical areas: automation research and development, capital acquisition, and mechanisms for technology transfers.⁽²⁶⁾ The utilities have promoted the development and application of library automation by serving as brokers for information, training, and computer and on-line services. However, as automation costs decrease and local expertise increases, many libraries are reducing their dependency on the bibliographic utilities for processing functions. The trend is toward the implementation of local, integrated, multi-function systems that can handle a variety of library operations. This development has led a number of libraries to limit the role of their bibliographic utility to that of a supplier of database resources.⁽²⁷⁾ These records are then transferred either via interactive telecommunications or via batch process tape from the utility into a local on-line catalogue.

26. Markuson, BE. *Cooperation and library network development*. College Research Library, March 1979, 40: 125-35.

27. Boss, RW. *Technology and the Modern Library*, Library Journal, June 15, 1984, 109: 1183-9

OPACs can substantially reduce the cost of maintaining a catalogue. Many paper files can be eliminated and decentralisation is possible because staff can access the on-line files wherever a terminal is located. If the OPAC is integrated with other technical services files in a full-function automated system, work throughout the department can be streamlined and reorganised.⁽²⁸⁾ The impact on staff responsibilities and assignments can be significant. Staff who in the past laboriously searched the printed multi-volume National Union Cataloguing for cataloguing copy now draw on cooperatively shared database to do fast, inexpensive cataloguing. Original cataloguers often find informative machine-readable records which they can manipulate electronically to create new cataloguing. While professional cataloguers still prepare original records, most "cooperative" cataloguing is now performed by para-professionals. The introduction of OPACs has eliminated the need to maintain many of the formerly essential card catalogues, authority files, and other labour-intensive paper files. Staff at lower levels are assuming more sophisticated responsibilities. The working environment in these catalogue departments is changing radically.⁽²⁹⁾

With paraprofessionals doing much of the on-line cataloguing and with fewer professional librarians involved, some writers are speculating about the future of cataloguers. Indeed, Robert Holley thinks they are an endangered species. He sees the greater use of paraprofessionals, reduced budgets, standardisation, de-emphasis of perfection of cataloguing, and automation as profoundly affecting the professional responsibilities of cataloguers. He feels that their numbers will continue to recede in the future and that the few remaining cataloguers will be

28. Freedman, M.J. *Automation and the future of technical services*. Library Journal, 15 June 1984, 109: 1202.

29. Harrington, S. *The changing environment in technical services*, Technical Services Quarterly, Winter 191986, 4: 7-20.

located at the Library of Congress, in large research libraries, and in important specialised collections. In other libraries, cataloguers will become managers and planners and will do little original cataloguing.⁽³⁰⁾

Prior to automation, acquisitions staff spent many hours manually searching the local card catalogue, the National Union Catalogue, and other bibliographic tools to verify book orders. They manually typed and mailed orders, claims, and cancellation forms. In addition, they maintained a number of paper files: on-order/in-process records, invoices, standing orders, correspondence, and encumbered/expended records. Automation has greatly simplified these procedures. The library's holdings are searched in an on-line catalogue or network file and titles not held by the library are verified on a bibliographic utility. Orders may be completed by sending them electronically to vendors.⁽³¹⁾

Claiming of non-receipted orders is an acquisitions task which greatly benefits from automation. When this process is carried out manually, it is both tedious and time-consuming. The on-order file must be searched, slips pulled, claim notices typed, and order slips refilled. A computer complete this process in a matter of seconds, producing claim alert lists and automatically generating claim notices.⁽³²⁾ Direct telecommunication with vendors and suppliers can transmit claims instantaneously. Other activities aided by automation are cancellation of orders, correspondence concerning incorrect or damaged items, maintenance of desiderata files, and monitoring vendor performance. Fund accounting is another process greatly improved by automation. It is no longer necessary to post encumbrances and expenditures manually and to wait for periodic cumulative reports. Instead, transactions

30. Holley, RP. *The future of cataloguers and cataloguing*. Journal of Academic Librarian, May 1981;7: 90-3.

31. Harrington, S. *op.cit.* p.12.

32. *Ibid.*

are automatically posted and fund balances are kept current. In libraries with OPACs, the status of an acquisitions order may be available at both staff and public terminals located throughout the library. Thus, from the time the acquisition record is first created, the user is able to determine the availability of the item. Once the item arrives, it becomes "In process" and users can request rush processing.⁽³³⁾ Through the use of on-line acquisitions systems, departments can perform functions more quickly and efficiently and at the same time provide better service to the public.

Serials automation has proceeded more slowly than that of other technical services operations. The undertaking has been difficult, complex, and frustrating. Efforts initiated in the early 1960s frequently met with failure. The vagaries of serial publication patterns, lack of a MARC serials format, and the variety of serial publishers were difficult to manage in early automated systems. Automated serials control, and, in particular, automated serials check-in, proved to be much more complicated to develop than originally anticipated.⁽³⁴⁾

During the 1980s, successful implementation of automated serials control, including check-in, claiming, binding control, and routing of materials has become more feasible. In the late 1980s, several serials subscription agencies, working with library system vendors, began to develop programs to tape-load serials invoices. In a 1983 survey of 47 bibliographic utilities, serials subscription agencies, automated library system vendors, and library software vendors, McQueen and Boss found nineteen automated serials control systems that were operational and twelve being developed and expected to be completed within the following year.⁽³⁵⁾ In the preautomated library, serials

33. Horny, K.L. Automation: the context and the potential. *In: Library technical services: operations and management*, ed. By Irene P. Godden. Orlando: Academic Press, 1984. pp.43-88.

34. Harrington, S. *op.cit.* p.15.

35. McQueen, J and Boss, R.W. Serial control in libraries: automated options. *Libr Technol Rep*, March/April 1984; 20: 89-282.

invoice processing, check-in, and claiming were time consuming, complicated, and tedious, while it is true that automated serials control benefits serials personnel, the library user gains significantly, as well. Through the use of public terminals, users can determine exactly what serial holdings the library has. As soon as an issue is checked in, the information becomes available to everyone.⁽³⁶⁾

Automation has often led to a re-evaluation of the organisational structure of serials units. Some serials specialists advocates the abolition of separate serials departments. Merging serials activities into those of other technical services departments may be more efficient and cost-effective. Organization by function, such as ordering and receiving, rather than by format may prove more economical. Automation is eliminating the need for separate serials and monographs departments in some libraries.⁽³⁷⁾

Acquisition systems collect and summarise data on newly acquired materials and identify their distribution by subject, price, publisher, or fund charged. Cooperative collection development and management have become increasingly important in libraries due to tight budgets, rising prices, and the information explosion. Bibliographic utilities facilitate these efforts through shared holdings information and automated interlibrary loan subsystems to speed resource sharing.⁽³⁸⁾ A number of machine-readable bibliographic tools are becoming available to libraries for use in the selection of recently published and retrospective titles. This increased use of machine-readable information to select new titles can eliminate much duplication of effort that exists in manual systems,

36. Harrington, S. *op.cit.* p. 17.

37. *Ibid.* p.17-18.

38. Magrill, RM and Hickey, DJ. Acquisition management and collection development in libraries. Chicago: ALA, 1984.

provide information in systematic manner, and greatly reduce typographical error in the preparation of orders⁽³⁹⁾ Aveney suggests that the day is not too distant when a librarian will be able to sit at a terminal and review all of the week's new publications, order or reject each title by touching a single key, and receive an up-to-date summary of the ordering activities and fund status at the end of each session.⁽⁴⁰⁾

As noted earlier, the distinctions between technical and public services are diminishing as personnel in both areas and library patrons use the same new resources and systems. Bibliographic utilities, originally designed to share cataloguing and processing functions, quickly became major tools for public services. By 1974, twenty-three distributive regional networks were operating.⁽⁴¹⁾ These networks have not been limited to one type of library and often extend beyond state boundaries. In addition to facilitating the sharing of cataloguing records, these consortia support union catalogues, interlibrary loan, electronic communication, verification and location of materials and cooperative collection building.

The Online Public Access Catalogue (OPAC) has heralded the start of *end user searching* and underlines the importance of designing systems that are responsive to the needs and satisfaction of the users.⁽⁴²⁾ OPACs, which provide speedy on-line access to all the library's holdings by means of a computer terminal, are affecting library operations as powerfully as has the appearance of bibliographic utilities and automated regional networks. OPACs serving either a

39. Harrington, S. op.cit. p. 14.

40. Aveney, B. *Electronic transmission in acquisition systems*. *Technical Services Quarterly*, Spring/ Summer 1985; 2: 17-31.

41. Pamour, V, Bellasai, M and Roderer, N. Resources and bibliographic support for a nation-wide program. Final report to the National Commission for libraries and Information Science. Washington, DC: Government Printing Office, 1974. pp.210-11.

42. Willemse, John, etal. Academic libraries and change. *In: Librarianship and information work worldwide 1993*. London: Bowker, 1993. p.29.

single institution or a group of institutions are now widespread and continue to be implemented in libraries across the country. New optical technologies make possible and affordable the mounting of CD-ROM (compact disk read-only memory) public catalogues at standalone microcomputer stations an operational reality virtually^{ly} any library.

OPACs, however, introduce a fundamental change in the way users get access to information about the local collection. The on-line catalogue makes the computer's extensive and intricate retrieval capabilities directly available to library users and permits users to have access to information in a more decentralised manner. The flexibility of computer searching permits many access points, allowing the patron to seek information in ways beyond those limited by alphabetical filing of author, title, series, and subject. MARC format has made possible the retrospective conversions of a library's entire paper catalogue into machine-readable records. Complete catalogues in the guise of computer terminals can be located throughout the library and in remote locations, as well. The on-line catalogue has great appeal for users, who have quickly seen its benefits.

Commercial on-line bibliographic databases preceded OPACs in bringing new technologies directly to library users. The number of commercial databases grew dramatically during the 1970s. Librarians use on-line database to prepare customise bibliographies, verify bibliographic citations, and answer reference questions. At short time a remote access terminal can provide information that would have previously taken hours to compile manually. Many of these earlier databases were the consequence of electronic publishing. The exponential growth of journals during the 1960s prompted publishers to seek new ways to more efficiently compile and print abstracts and indexes. As they turned to

computer files to manage information for efficient printing, these same files became searchable by computers. One of the first organizations to use this technique was the National Library of Medicine, which computerized the production of *Index Medicus* in the mid 1960s, and began the MEDLARS (Medical Literature Analysis and Retrieval System) files.⁽⁴³⁾

Telecommunications networks like Telenet and Tymnet dramatically reduced the cost of connect time and accelerated the spread of on-line searching of remote databases. In 1988, Hanson estimated that over 2000 on-line databases were currently available, with between forty and fifty being added each year.⁽⁴⁴⁾

Because of the costs of accessing remote databases and the differing search protocols, most searching of this type of database is still performed by librarians. Some institutions are also experimenting with end-user searching of remote databases, eliminating librarian mediation after initial training. The rapid advances in optical technology have placed many indexing and abstracting databases within the library in the form of CD-ROM. Some libraries are also purchasing complete or partial databases and mounting them on local mainframe computers, accessible through the OPAC. These resources are often self-explanatory and relatively easy for patrons to use. In addition to bibliographic databases, textual and aggregate data files are becoming widely available through libraries. These range from encyclopedias and dictionaries to census data and other statistical compilations. They may be accessible either via a local mainframe computer or self-contained microcomputer work stations. Rapid searching and machine manipulation of data to meet individual needs add to the appeal of these formats.

43. Henry, WM, etal. *Online searching*. London: Butterworth, 1980. p.2.

44. Hanson, ER. *College and university libraries: traditions, trends and technology*. *Adv Libr Admin Org.*, 1988; 7: 222.

Automated serials holdings lists, an early by-product of serials automation, met with popular success. Such paper or microform offprints, which contain varying amounts of information, range from simple alphabetical lists of titles and holdings to those providing more detail. Libraries can update them frequently and easily distribute them to multiple locations. Serials holdings lists have been well received by users who find them convenient and easy to use.⁽⁴⁵⁾

Advances in automation also made possible the rapid development of union lists of serials, combining holdings information for a number of libraries. Library networks made available a central agency which could assemble, merge, and maintain the bibliographic and holdings information of member libraries. State and regional union lists serve as basic resource-sharing tools and are the result of a form of detailed, cooperative information sharing impossible before library automation.⁽⁴⁶⁾

Library automation has provided significant improvements in interlibrary loan operations. The bibliographic utilities, as a result of supporting regional or national union catalogues, permit users across the region and nation to know which member libraries own which specific titles. Additionally, interlibrary loan requests can be transmitted and redirected immediately via the utilities' communications systems. Digital telefacsimile machines are facilitating instantaneous transmission of printed information.

Circulation of library materials was one of the early areas of automation and, in many cases, preceded the implementation of OPACs. By automatically recording check-outs and returns, computers can replace many of the paper files maintained in circulation operations. Most early automated circulation systems

45. Harrington, S. *op.cit.* p. 15.

46. *Ibid.*

were custom-developed batch systems for a single library of library system. The first turnkey systems available in the early 1970s, were a single-purpose product exclusively for library circulation activities.⁽⁴⁷⁾ Newer systems are integrated components of full-phase automated systems and perform a variety of functions from the generation of recall and overdue notices to reporting availability of items in the on-line catalogue. These functions save staff time, enhance efficiency, and improve patron service.

As in technical services, public services operations have experienced movement of the more routine functions to lower levels of staff. As a result of library automation the verification of bibliographic citations has often become routine and is handled as "ready reference" searching by support staff. The new emphasis on access to sophisticated information sources has placed new demands on librarians, who must master a variety of computer files. Additionally, librarians are often expected to train and advise patrons in their use of these files.

Woodsworth and Hoffman *realized* the new opportunities as well as new problems facing librarians, who are expected to have expertise in database management, computer system design and operation, and telecommunication.⁽⁴⁸⁾ Librarians may be involved in the design of local user interface terminal screens and in defining local modifications of turnkey systems. New information technologies place new demands on librarians in understanding and applying copyright law. Librarians are expected to remain current with a variety of rapidly changing information technologies and to assist patrons in their use.

47. Saffady, W. Library automation: an overview. *Library Trends*, Winter 1988, 9: 269-81.

48. Woodsworth, A and Hoffman, E. *Information technology: new opportunities-new problems*. *Journal of Library Administration*, 1988, 9: 91-104.

So far library organisational structures are concerned it is to be said according to Peter Drucker⁽⁴⁹⁾ prediction that "the typical large organization in the year 2000 will have fewer than half the levels of management of its counterpart today, and no more than a third the managers. The typical organization will be knowledge based, and organization composed largely of specialist who direct and discipline their own performance through organised feedback form colleagues, customers, and head-quarters-an information-based organization". Organisational structures will flatten as responsibility is distributed and individuals will operate more autonomously. What information is available indicates that the organisational structures of libraries are changing in ways very similar to those predicated by Drucker and other organisational theorists. Many of these changes imply significant deviations form the familiar organisational structures of libraries. Libraries have often been characterised by hierarchy, tradition, and clearly demarcated responsibilities and stratified staffing. In 1971, Smith said "The... functions that Librarians perform are, more often than not, circumscribed by regulations and routine, so lacking in autonomy, individual judgement, and expertness, as to qualify far more as bureaucratic rather than professional activity."⁽⁵⁰⁾ This scenario is fading as a consequence of new technologies. Much speculation exists about exactly what the structure of libraries will be in the future. Firm predictions are risky since the changes are now in process, but a number of writers have identified what they see as significant trends. Cline and Sinnott examined the effect of automation on the structure and functioning of four university libraries in their 1983 study.⁽⁵¹⁾ At that

49. Drucker, PF. *The coming of the new organization*. Harvard Business Review, January/ February 1988; 88: 45-53.

50. Smith, E. *Service and house keeping: changing professional and non-professional responsibilities in the academic research library*, paper delivered at the Indiana University Library Dedication, October 9-10, 1971. pp.59-60.

51. Cline, HF and Sinnott, LT. *The Electronic Library*. Lexington, MA: Lexington Books, 1983, p.172.

time they saw a movement toward reorganisation of libraries as a result of greatly diminished workload for acquisitions and original cataloguing, the adoption of a matrix form of organization, and the grouping of library staff to serve subject fields and disciplines with librarians having multiple functional assignments within their specific disciplines.

An article on the impact of implementing an OPAC in the North Caroline State University libraries reports the introduction of new lines of authority within the library's traditional organisational hierarchy. Communication increased among all divisions of the library system, as well as between the library and the rest of the campus. An additional advantage is that staff members have gained increased opportunities for professional division making.⁽⁵²⁾

Many writers mention "blurring" of the distinction between technical and public services and question the traditional separation of these functions. The argument is that units have been historically organised around different physical files (such as cataloguing, acquisition, serials check-in, etc.). As single, integrated on-line systems become widely available and on-line authority files eliminate the need for multiple paper files, anyone can tap into these files if a terminal is available. There is less need for the more rigid divisions as these functions can be integrated.⁽⁵³⁾

Libraries are experiencing increased communication among departments, bridging the traditional gaps between technical and public services. For example, system designers need to turn to reference librarians to learn about how users are dealing with new systems; public services librarians need to get more

52. Davis, JY. *The impact of an online catalog on library technical services: The NCSU experience. Technical Services Quarterly*, 1987; 5: 1-17.

53. Myers, M. Personnel considerations in library automation. *In: Human aspects of library automation*, ed. By Debora Shaw. Urbana-Champaign: Graduate School of Library and Information Science, University of Illinois, 1986. pp.30-45.

information from the technical services staff as reference librarians find that instructional work increases with teaching people how to use machines.⁽⁵⁴⁾

The studies of Association of Research Libraries (ARL) in USA has found some integration of staff through assignment of multiple roles, dual functions, or job rotation (doing part public services/part technical services work).⁽⁵⁵⁾ Various writers have alluded to the fact that technical services professionals are being deployed into public services. The result is improved communication and better understanding. According to Gorman, the worst thing about the traditional separation between technical and public services has been that it has deprived the public of contact with some very fine librarians. Technical services librarians with an enormous amount of knowledge about the material they process have seldom been called upon to communicate that information to the library's users. The blurring of previously rigid organisation lines offers new opportunities for maximising staff resources.⁽⁵⁶⁾ The arguments in favour of centralisation are fading with the implementation of new technologies for document storage and retrieval and the growth of various on-line systems. Several writers have suggested various decentralised structures, among them, Atkinson, Martell, Cline and Sinnott⁽⁵⁷⁾ and Stuart⁽⁵⁸⁾ supported transforming services into "specialized user-oriented information centres". Independent

54. Cochrane, PA. *The changing roles and relationships of staff in technical services and reference/readers' services in the era of Online Public Access Catalogs*. *Reference Library*, Fall/Winter 1983; 9:51-3.

55. Association of Research Libraries. *Automation and reorganisation of technical and public service*. Washington, DC: Office of Management Studies; Association of Research Libraries, 1985. pp.i-ii.

56. Gorman, M. The future of serial control and its administrative implications for library. *In*: *Serial automation for acquisitions and inventory control*, ed. By WG Potter and AF Sirkin. Chicago: ALA, 1981. pp.120-33.

57. Atkinson, HC. The impact new technology on library organization. *In*: *The Bowker Annual of Library and Book Trade information*, ed. by J Ehresmann. 29th edn. New York: RR Bowker, 1984. p.170. *See also*: Martell, CR. *The Client-Centered Academic Library: an organizational model*. Westport, CT: Greenwood Press, 1983.

58. Stuart, RD. *Preparing libraries for change*. *Library Journal*, September 15, 1984; 109: 1726.

decision making becomes important in such an environment. Stueart saw a trend to place "the brightest, the most innovative individuals in non-traditional settings where they see opportunities for self-expression, for implementing the professional librarians own ideas and for innovative change which they don't see in what they perceive as rather rigid, traditional hierarchical structures".⁽⁵⁹⁾ Independence will be the key word for these new personnel and library will be as great a challenge to library management as any heretofore experienced.⁽⁶⁰⁾ In supplementing the idea Nelson described the role of professional librarian is "The librarian today must be capable of dealing with management and budget, preservation and public relations, architecture and cooperative planning, networks and document deliver, online services and information systems, and a long roll-call of other matter that in their sum provide a partial definition of modern librarianship".⁽⁶¹⁾

Numerous writers have noted an increasing need for continuing education. Myers sees a trend toward more intensive, structured, formalised, and centralised staff training.⁽⁶²⁾ According to Davis, automation training provides an opportunity for a much broader program of continuing education and staff development.⁽⁶³⁾ Stueart notes that implications for staff renewal and development are at their height in a library's change process.⁽⁶⁴⁾

As noted in the earlier sections on technical and public services, roles of both professionals and non-professionals are changing. The reallocation of task-

59. Stuert, R.D. *op.cit.* p. 1725.

60. Martin, M.S. The orgnizational and budgetary effects of automation on libraries. *Advance in Library Administration*, 1983; 2: 69-81.

61. Nelson, M. *Pell Mell back to square one*. *Wilson Library Bulletin*, October 1987; 62:4.

62. Myers, M. *op.cit.* p.37.

63. Davis, JY. *op.cit.* p.15.

64. Stuert, R.D. *op.cit.* p. 1726.

oriented work from the professional staff to the support staff illustrates that “once a technology is applied to carry out very complex, routine mental work, that work is driven downward in the work hierarchy, away from professionals, whose work then expands to comprehend new and more challenging responsibilities”.⁽⁶⁵⁾ One consequence of this migration of responsibilities is the creation of a second type of library professional, individuals without masters degrees who now supervise operational units previously managed by professional librarians. These individuals supervise operational units such as ILL, circulation, acquisitions, etc. They hire, train, supervise, and have an increasingly larger role in the management and goal setting of the organization.⁽⁶⁶⁾

This reassignment of responsibilities has led to some role confusion between professional librarians and support staff and to a growing dissatisfaction on the part of some support staff about their organisational status. Dougherty⁽⁶⁷⁾ states that professional “librarians spend more time away from the ‘desks. They actively engage in the governance of libraries, and they spend more time at conferences. The tasks they performed now must be performed in their absence by assistants”. Questions of who has the expertise for decision making and how decisions are being made can cause dissonance and stress.

Professional and non-professional staff often express increased interest in planning and governance. The result may be tension between the need of the library director to retain administrative accountability and the desire of staff to have greater participation in decision making. Many libraries use committees,

65. Veaner, AB. *Librarians: the next generation*. *Library Journal*, April 1984; 109: 623-4.

66. Henshaw, R. *Library to library*. *Wilson Library Bulletin*, April 1986; 61: 44-54.

67. Dougherty, RM. Personnel needs for librarianship's uncertain future. In: *Academic libraries by the year 2000*, ed. By H Poole. New York: RR Bowker, 1977. p.112.

task forces, and working groups to collect information and prepare recommendations regarding new initiatives. Most major automation projects involve the creation of working groups composed of members from departments throughout the library. Such participation in planning and implementation draws on the skills of staff and facilitates automation acceptance and support. Administrative responsibility remains clear and staff play a meaningful role in policy decisions.

Librarians are seeking to merge new technologies into an existing organization while maintaining and supporting many of its traditional features. This goal is further complicated by the wide variety of new technologies found in present-day libraries and the fact that new technologies seldom replace old ones.⁽⁶⁸⁾ Libraries may be somewhat unique in their need to sustain this mix of old and new technologies. Libraries which retain successive generations of audio and video recordings are often expected to supply the appropriate playing devices. Research libraries' collections may range from papyrus and vellum to microform and digital optical discs. New technologies have always existed alongside the old, requiring staff to support both. This dualism is compounded by the rapid rate with which technologies are now changing.

The challenge facing libraries is to continue to implement those new innovations which are appropriate and to integrate them into existing operations. The result is a transformation. Inevitably, the introduction of automation requires new procedures, new staffing patterns, new budget and programme priorities, shifts in authority and decision making, changes in expenditure patterns, and new and changing services.⁽⁶⁹⁾

68. Atkison, HC. p.170.

69. Martin, MS. p.73

This need to consciously devise methods of planning for and responding to rapidly changing technologies is not unique to libraries. Shpshana Zaboff argues convincingly that society as a whole is experiencing a significant, perhaps cataclysmic change in the way the world is viewed, experienced, and organised.⁽⁷⁰⁾ She also stated that history reveals the power of certain technological innovations to transform the mental life of an era and that computer-based information technology is one such innovation, inaugurating a “historical transformation of immense proportions”.⁽⁷¹⁾

In earlier sections researcher presented fairly concrete evidence that the library paradigm-how libraries are viewed, experienced, and organised-is changing, driven by new technologies. The severity of the problems that are confronting libraries during this period of rapid technological change are not insignificant. The transition period to the new electronic library will not be easy for either librarian or user. Many librarians may have trouble adapting to a working environment very different from that in which they began their careers, and some may resist technological change.⁽⁷²⁾ They seek what Toffler called “a separate ‘peace,’ a diplomatic immunity from change”.⁽⁷³⁾ Veaner warned that without extensive retraining, some librarians may suffer occupational displacement as the practice of librarianship changes.⁽⁷⁴⁾

Matheson observed that many librarians share the belief that due to evolving new roles libraries are engaged in an evolutionary rather than a revolutionary process. She stated that this is a dangerously passive perspective for the profession, stressing

70. Zuboff, S. New worlds of computer-mediated work. *Harvard Business Review*, September/October 1982; 60:142-52.

71. Zuboff, S. *In the age of the smart machine : the future of work and power*. New York: Basic Books, 1988. p.xiii.

72. Fine, S. Technology and libraries: a behavioral perspective. *In: Communicating information: proceedings of the 3rd ASIS Annual Meeting*, ed. By AR Benefeld and EJ Kazlauskas. New York: Knowledge Industry Publications, 1980. p.246-9.

73. Toffler, A. *Future stock*. New York: Random House, 1970. p.381.

74. Veaner, AB. *op.cit.* p. 625.

that "there is a total restructuring in progress of who, what, and how information is created, owned, and shared. We librarians... will be out of work, unless we... re-examine our basic assumptions and develop new strategies for staying in business".⁽⁷⁵⁾

There appears to be recognition, at least at the philosophical level, that the library paradigm is changing, but Matheson doubts if there is a group commitment among the library profession as to what it should be. She affirms, "We all understand that the time has passed for building definitive collections of books and materials. But we seem to be engaged in compiling definitive collections of bibliographic data instead".⁽⁷⁶⁾ Martin observed, in a similar vein, that librarians have given scant attention to the fundamental shift in the nature of libraries and what librarians do.⁽⁷⁷⁾ Their response has been minimal and concentrated on the marginal effects, on how to catalogue a book in the on-line environment rather than on the larger issue of the meaning of pervasive automation for library users and staff.

Librarians need to institute formal planning and management controls and ensure the availability of staff trained to work with new technologies.⁽⁷⁸⁾ Issues relating to organisational design, management techniques, staffing and personnel are critical. Unfortunately, Drake observed, "libraries have traditionally not approached change systematically".⁽⁷⁹⁾ In 1985, the Association of Research Libraries reported that few organisational models for the 1990s and beyond existed, although several libraries participating in the study confirmed a need for organisational change.⁽⁸⁰⁾

75. Matheson, NW. *The academic library Nexus*. College Research Library, May 1984; 45: 208.

76. *Ibid.*

77. Martin, MS. *op.cit.* p.73.

78. Mann, TW, Chao, YTD and Hughes KS. Library automation: a survey of leading academic and public libraries in the United States. San Francisco: Peat Marwick, 1986.

79. Drake, MA. Managing innovation in academic libraries. College Research Library, November 1979; 40:503.

80. Cochrane, PA. *op.cit.* p. 1.

METHODOLOGY

CHAPTER SEVEN

METHODOLOGY

The methods used in this study have been drawn from those favored in historical research as well other disciplines. As the purpose here was to recreate a period of evolutionary and revolutionary history of new technologies in the libraries and information centres, a multi-disciplinary approach was deemed more appropriate. Primary documents comprised of contemporary periodical and journals, nonfiction literature as well as scientific and technological texts, encyclopedias, handbooks, and manuals in use at the time. Of these, periodicals and journals have been used most extensively in the study. Archival matters (institutional records and government documents) were another primary sources, though dependence on them has not been predominant.

A source that was considered significant for this study was interviews, information was also collected through questionnaire survey, as well as private and official papers and documents.

The methodology followed for achieving the distinct objectives as mentioned in the *chapter one* is as follows:

Historical background

This study is firstly based on tracing the origin of and the factors leading to the establishment of various types of libraries in existence and their developments as well as what technologies are available with these libraries up to October 1996.

Survey Literature

- I surveyed literature on the developments in innovative new technology in national as well as international sources ;
- Literature on new technology published ~~at~~ home and abroad during the recent years in the form of books, journals, dissertations, and microforms in all major libraries (i.e. public, special, academic) of Bangladesh and other countries was searched;
- I collected literature and printouts of searches through OCLC on-line from the ERIC Clearinghouse on Information Resources, Syracuse University, 030 Huntington Hall, Syracuse, New York, USA, as well as from World Bank database in Washington, DC, and searches through SILAS OPAC Networking System in the National Library and National University Library of Singapore;
- I also collected relevant literature and bibliographies with abstracts on the basis of OCLC searches from the Syracuse University, USA, and also collected ASLIB Proceedings from 1980 to 1994 from the ASLIB head quarters in London through a British citizen John H. Snider, a friend and former colleague of mine; reports and working papers on NT from the Joint Commission ..., England and articles from Dr. Janak Raj of India through correspondence.

Study Visits

- I spent about one year in visiting the major libraries in Dhaka and the libraries outside Dhaka, Chittagong, Rajshahi, Khulna, Mymensingh to search and collect the source materials as well as data through a questionnaire for this study.
- I also visited the National University of Singapore, National Library of Singapore, The British Council in Singapore, National Library of India in Calcutta for the source materials relating to this study.

Personal Interviews

I interviewed the personnel in the institutions where work on library automation is being progressed and also discussed with librarians, administrators, planners, experts in the field of new technology and obtained their views relating to use of new technologies, made contacts with leading, English, Indian, Singaporean, and Bangladeshi experts and scientists for advice, opinion, and comments in this regard.

Survey

I prepared a questionnaire and sent it to few librarians and information scientists of different categories of libraries and information centres of Bangladesh for pre-testing. Pre-test has done successfully. Few moderations were also made on questionnaire

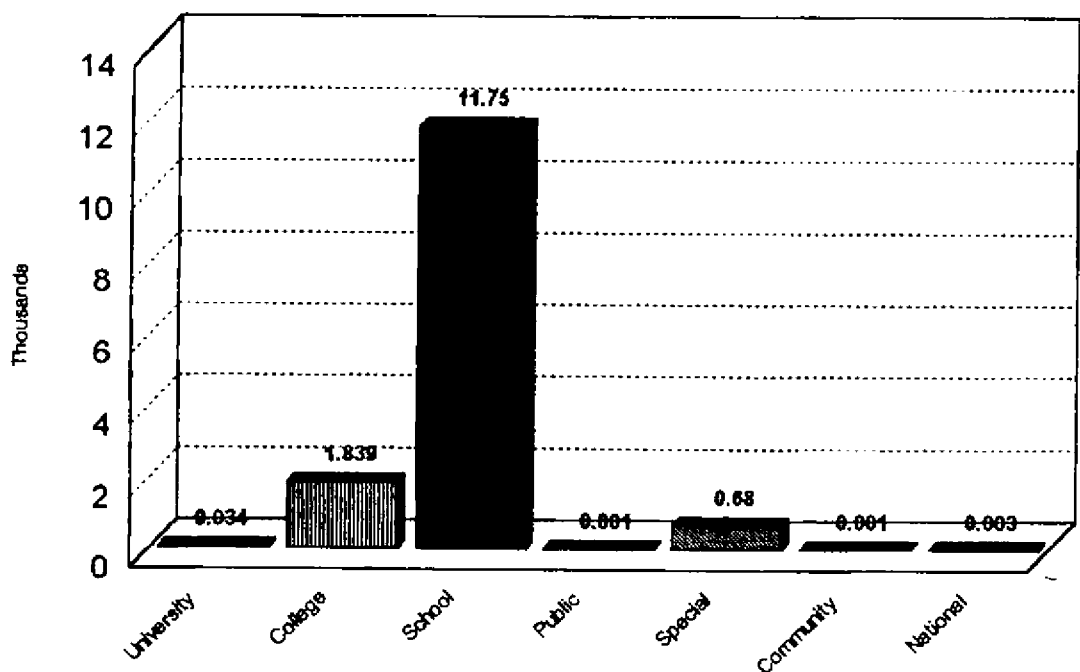


Fig.-9: Total number of libraries in Bangladesh

after getting it back from the samples selected for pre-testing. Later I make the questionnaire exclusively self explained for acquiring information relating to new technologies. However, the representative samples of the study were covered the whole library systems of Bangladesh as shown in the *Fig. 9*. Thus the questionnaire

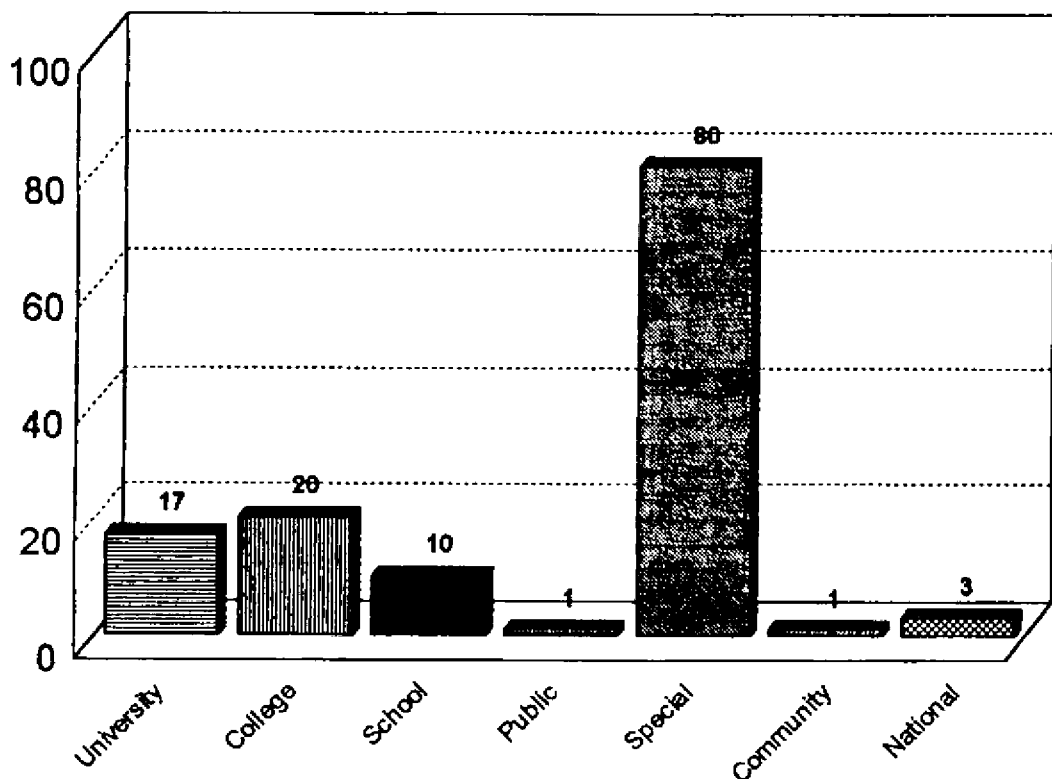


Fig.-10: Representative samples of the study (n=132)

were sent to 132 librarians and information scientists of representative sample libraries as shown in *Fig. 10* for collecting data and information which was analyzed for the purpose of the study. The sample libraries were selected randomly but these are representative of the library systems of Bangladesh (*Appendix-B*).

Sample Design

For ensuring representativeness from different types of libraries and considering the services and libraries which used at least one of the new technologies were purposefully selected and brought under the investigation. Sample has chosen randomly as a representative of each of the categories of libraries of Bangladesh. There are four categories of libraries. These are academic libraries (e.g. university, college, school, etc.), public libraries including community libraries, special libraries (e.g. government institutions, NGOs, scientific and research organizations, etc.), and national libraries.

- Questionnaire were served to librarians and information scientists only to gather data.
- Provision was made in the questionnaire to gather information on collections, activities performed, and the services offered.
- Attempts were made to know the existing problems of installation of new technologies in libraries and information services of Bangladesh.
- Formulated a set of criteria for the use of new technologies on the basis of the data collected through questionnaires.
- Consolidated the problems and their prospective merits and use in the context of changes in new technologies and projected the changes likely to occur in the near future.
- Drawn a set of propositions and a phased plan of action on the light of data gathered and interpreted data from survey and personal interviews.
- The narrative method with graphic presentation was followed with a description of the systems, annotations, and interpretations.

Data Processing

The questionnaire of this study were duly edited to verify the data recorded in the questionnaire^{and the data} have been carefully and accurately filled in. The questionnaires were also duly coded after editing for computer input. The steps followed in the process of data are as follows:

- Entering data on the computer;
- Conducting validation checks to ensure that data have been correctly entered on computer;
- Preparation of output tables.

Sources of Information

The sources of materials are described in order of importance to design the study as follows:

-Primary Sources

These include a number of unpublished doctoral dissertations, with two published dissertations. The dissertations were widely used. Primary sources also include relevant unpublished masters' theses of the Department of Library and Information Science, University of Dhaka and Rajshahi University, and BUET, etc. as well as reports and mimeographs, plans, monographs, official documents, etc. that I have used minutely.

-Secondary Sources

These are articles in the professional journals, encyclopedias, directories, yearbooks, handbooks, manuals, gazettes, and books of personal as well as corporate authorship of home and abroad. Of these, articles in journals are large in number than the other information sources that I used intensively.

-Tertiary Sources

These include directories, guides, and lists which ^{were} meticulously used for this study. All the above source materials are indexed alphabetically by categories of types of materials and are appended in bibliography at the end of the text in Appendix-B.

-Non-documentary Sources

These include both formal and non-formal sources. Formal source covers discussions with experts, scientists, potential users, eminent scholars, educationists, hard and software engineers, some of whom are mentioned in the acknowledgments. The non-formal sources include conversation with colleagues and visitors and friends, attendance at the professional meeting, seminars arranged by BALID, LAB, CDL, UGC, and the informal discussions with colleagues, leading librarians, experts of the country and the library and information science specialists abroad. Besides the above sources, I used my own published sources numbering 50 for the last 18 years.

Transliteration

Other than English some words of other languages were used in the text of this study. All non-English words (other than names of the persons and places) have italicized. As this work abounds with numerous non-English terms (mostly *Bengali* including some *Urdu*, and *Persian*), for the sake of readability and typographical convenience, I have eschewed the traditional *Sanskritized* system of transliteration with diacritical marks and adopted a simplified one. In the case of Bengali words, this simplification is tantamount to ignoring the difference between long and short vowels and representing the consonants by their nearest English equivalents.

The following table of Bengali vowels and consonants provides the standard transliterations (as row marked in the below):

	a	ā	i	ī	u	ū	r	e	ai	o	au
→	a	ā	i	i/ee	u	u	ri	e	ai	o	au
	k	kh	g	gh	n	c	ch	j	jh	n	
→	k	kh	g	gh	n	ch	chh	j	jh	n	
	ṭ	ṭh	ḍ	ḍh	ṇ	t	th	d	dh	n	
→	t	th	d	dh	n	t	th	d	dh	n	
	p	ph	b	bh	m	y	r	l	v	ṣ	
→	p	ph	b	bh	m	j/y	r	l	v/w/b	sh	
	sh	s	h	ḍ	ḍh						
→	sh	s	h	rh	rh						

Reference

For reference cited in footnotes and bibliography, I have followed, as far as possible, AACR-2 (Anglo-American Cataloguing Rules-2nd edn.) for books, encyclopedias, dissertations, proceedings, dictionaries, manuals, handbooks, etc. and *Vancouver Styles* for articles of journals and periodicals. In referring to an article in a given journal, apart from its date, and its locations have been specified by a sequence of three numbers: volume (issue): page. For example: 12 (2): 34 *stands for* volume-12, issue-2, and page-34.

Abbreviations and Translations

Other than standard abbreviations as mentioned in MLA Handbook (Gibaldi and Achtert. MLA Handbook. New York: Modern Language Association, 1980) local abbreviations as used have been followed in the text of this study. Unless otherwise stated, all translations from Bengali texts have been made by myself.

***USE OF NEW TECHNOLOGIES IN
BANGLADESH***

CHAPTER EIGHT

USE OF NEW TECHNOLOGIES IN BANGLADESH

With the explosion in new information technology, literature has been growing excessively causing problems not only of space for storage but making the location of and access to required information very difficult. It is forecast that by the year 2000 every scientist will use a terminal in the office and one at home to retrieve and transmit information. CD-ROM (Compact Disc-Read Only Memory) technology will eventually store one-third of all materials that are stored on microfilm, library catalogues and traditional on-line database.⁽¹⁾

However, if this is going to be the future, Bangladesh cannot afford to lag behind in the application of new technology and will have to be equipped with up-to-date information and communication systems. We see advances in the field of micrographics, computer technology, and telecommunication technology. The efficiency, accuracy, and reliability of the computer in handling massive data have naturally attracted the attention of the librarians and information scientists, technologists as well as documentalists.

Computerised information processing has gone across several generations of computers in the developed world. In fact, it is now using fourth-generation computer technology, and fifth-generation is coming up shortly. Minicomputers as well as microcomputers are being used in the field of information systems.

1. Hussain, Nargis. *CD-ROM and appropriate technology for developing countries: LISA's role in Indian libraries*. *Herald of Library Science*, Jan-April 1988, 27(1-2):56.

However, the use of computer in information processing and other technology, such as E-mail, Fax, Telephone, etc., in disseminating information has just begun in Bangladesh.

It may be said according to Gupta⁽²⁾ that 'in spite of the socio-economic problems, Bangladesh has moved right along towards the general trends of adopting modern computer science and technology in order to keep pace with the rest of the world'. There is an urgent need for books, periodicals, and new information technology in Bangladesh. There is also an urgent need to ensure that the already existing resources of information and new technology are properly shared and utilised. There is little cooperation among libraries in sharing their resources. Libraries have, for instance, rarely shared duplicating facilities for catalogue cards or acquisition lists or new arrivals; and the drive toward pooling resources to produce union list or catalogue has remained static. This is partly because most libraries lack the services of necessary new technology and work-force with the result that there exists presently a very blurred picture of existing library resources and services in Bangladesh.

In Bangladesh, most libraries are being still handled in a conventional or old manual way. Books still pile up in the processing department and sometimes become outdated by the time these are catalogued. The classification system is usually DDC, although sometimes the UDC, LC, NLM systems are being used in the libraries of Bangladesh. Generally, there is no cooperative attitude among professional librarians and the libraries are not very conscientious about the stack-ness of their library systems and services. The patron service is sometimes overlooked, perhaps as a result of their indifference and basic ignorance of bibliographic services.

2. Gupta, K. Das. *Indian libraries: documentation and automation in library service*. Intl Libr Rev, 1979; 11:464.

University libraries are not any exception to this situation. Student enrolments may be high in some large universities, but departmental libraries reduce pressure for library services by university librarians. Thus the libraries are not yet trying for changes. One or two may be exceptional.

Special libraries as well as some NGO-libraries in Bangladesh have built up a good record for the activity that is now described as information and documentation services. These services are considered as part of the bibliographic service in Bangladesh. These services usually include cataloguing, classification, indexing, abstracting, editing, translating, current awareness, inter-library lending in very exceptional cases, and preparing materials of research value for publication.

“Besides the documentation and information service, as a part of these bibliographic services to the readers, some special and research library has begun providing information retrieval services to help research workers and academicians to keep them updated. The science and technology plan of the Government of Bangladesh includes a proposal for the development of a national science and technology information policy (NASTIP) adopted in 1986”.⁽³⁾ This, it is hoped, would enable the country to meet the information demands of scientists and industrial researchers.

In spite of this policy, strategy and planning of the Government and private sector, use of new information technology for processing is still in its very early stage in Bangladesh. Although the library community has accepted the fact that there is an immense need of new information technologies for information processing and disseminating in order to keep pace with the present scientific world, the progress in

3. National Science and Technology Information Policy of Bangladesh. In: Proceedings of the Seminar on Impact of National Science and Technology Information Policy on the Socio-economic development. 23-24 June 1988; organised by Science and Technology Division, Library Association of Bangladesh and BANSDOC. Dhaka: BANSDOC, 1988. P.17.

creating such information processing and disseminating system is rather slow. Presently, technologies are being used only for indexing, cataloguing, current awareness, SDI (*Selective Dissemination of Information*) services and off -line, etc.

Khan⁽⁴⁾ stated in his study that Bangladesh entered the age of new technology with computer in 1964, when the Bangladesh Atomic Energy Centre (BAEC), Dhaka, installed the first computer in the country for research and development (R & D) purposes (as shown in the *Table: 8*). This computer has been used extensively by organisations, such as the Planning Commission, the Bangladesh Institute of Development Studies, The Education Commission, the universities of Dhaka, Chittagong, Rajshahi, Khulna, Sylhet, and the Bangladesh University of Engineering and Technology. The *Table-8* showing the use of microcomputers and minicomputers in important institutes is given below:

Table-8: Microcomputers and Minicomputers in use in the Bangladesh

SL No	Name of the Organisation	Use of Computer	Initiation
01	Adamjee Jute Mills	IBM 370/115	1960s
02	Agrani Bank Ltd	IBM 1401 since 1967; replaced by IBMS/136 in 1981 and IBM4700 Banking terminal	1960s
03	American Express International Banking Corporation	Honeywell DPS 6/xx	1980s
04	Ministry of Establishment	Honeywell DPS 6/xx	1980s
05	Gorashal Fertilizer factory	Honeywell DPS 6/xx	1980s
06	Arab Bangladesh Bank	IBM S/34 & S/36	1980s
07	Philips Bangladesh	IBM S/34 & S/36	1980s
08	Bangladesh Agricultural Research Council (BARC)	IBM S/34, Apple Mac	1980s
09	Bangladesh Biman	IBM S/34	1980s
10	Bangladesh Bureau of Educational Information and statistics (BANBIES)	IBM 386	1980s
11	Bangladesh Chemical Industries Corporation	IBM S/34	1980s
12	Bangladesh Inland Water Transport Corporation (BIWTC)	IBM S/34	1980s
13	Bangladesh Management Development Centre (BMDC)	IBM386	1980s
14	Bangladesh Meteorological Organization	IBM S/34	1980s
15	Department of Hydrology	IBM S/34	1980s
16	M/O External Relations Division	IBM 486	1980s

4. Khan, M. Shamsul Islam. *Development of new information technologies and their application and prospects in Bangladesh*. Media Asla, 1989; 16 (1): 36.

SL No	Name of the Organization	Use of Computer	Initiation
17	National Institute of Population Research and training (NIPORT)	IBM S/34	1980s
18	Population Control and Family Planning Division	IBM 486	1980s
19	Project Implementation Bureau (PIB)	IBM 486	1980s
20	Bangladesh Bank (BB)	IBM 370/115, 486, Dx2	1980
21	Bangladesh Export Import Company (BEXIMCO)	IBM AS /400	1980s
22	International Business Machine (IBM)	IBM AS/400	1980s
23	Bangladesh Institute of Development Studies (BIDS)	Prime 250	1980s
24	Bangladesh Oxygen Limited	IBM S/36	1980s
25	Bangladesh Tobacco Company	IBM S/36	1980s
26	Ciba-Geigy	IBM S/36	1980s
27	Squibbs	IBM S/36	1980s
28	Bangladesh University of Engineering and Technology (BUET)	IBM S/370	1978
29	Bank of Credit and Commerce International	NCR	1980s
30	Grindlays Bank	NCR	1980s
31	Bangladesh Bureau of Statistics	IBM 360 replaced by IBM 4341 and S/34	1973
32	University of Dhaka (DU)	IBM 4331, Model Group 2 system	1980s
33	Bangladesh Atomic Energy Centre (BAEC)	IBM 1620 Installed IBM 4341	1964
34	International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR)	IBM S/34 Installed IBM 4331 Model Group 2 system in 1984 and up graded to 4361 in April 1986	1980s
35	Islamic Centre for Vocational Training and Research (ICTVTR)	IBM 9370	1988
36	Space and Remote Sensing organisation (SPARSO)	Vax 750	1980s
37	Universal Primary Education Project (USAID Project)	IBM S/36	1980s
38	Jiban Bima Corporation	IBM 4331 Model Group 2 system	1980s
39	President's Secretariat	IBM 4341	1980s
40	Bangladesh Agricultural University	IBM S/36	1980s
41	Bangladesh National Nutrition Council (BNNC)	IBM 386	1990s
42	Institute of Nutrition and Food Science (INFS)	IBM S/34	1990s
43	Ministry of Irrigation and Food control	IBM S/34	1990s
44	North South University	IBM S/36, 486 Dx2, 66 MHZ	1992
45	Independent University Bangladesh	IBM 386	1993
46	International University of Business, Agriculture and Technology (IUBAT)	IBM 386	1993
47	Bangladesh Agriculture Research Institute (BARI)	IBM 386	1990s
48	AB Wing of the Ministry of Finance	Honeywell DPS 6/xx	1980s
49	Power Development Board (PDB)	Honeywell DPS 6/xx	1980s
50	Water Development Board (WDB)	Honeywell DPS 6/xx	1980s
51	Investment Corporation of Bangladesh (ICB)	IBM S/36	1980S

SL	Name of the Organization	Use of computer	Initiation
52	Janata Bank	IBM S/36	1980s
53	Telegraph & Telephone Board (T&T)	IBM S/34	1980s
54	Diabetic Association (BIRDEM)	IBM S/36	1980s
55	House Building Finance Corporation	Honeywell DPS 6/xx	1980s
56	Institute of Business Administration (IBA)	IBM S/36	1990s
57	Rupali Bank Ltd.	IBM S/36	1980s
58	Bangladesh Krishi Bank	IBM S/36	1980s
59	IFIC Bank Ltd.	IBM S/36	1980s
60	Standard Chartered Bank	IBM 4700	1980s
61	Indosuez Banque	IBM 4700	1980s
62	Islamic Bank	IBM S/36	1980s
63	Bangladesh Open University	IBM 486	1992
64	Children's Nutrition Unit, SCF(UK)	IBM 386	1988
65	Ain-O-Shalish Kendra	IBM S/36	1990s
66	Bangladesh Family Planning Association (FPAB)	IBM 386, Apple Mac	1993
74	Bangladesh Shipping Corporation (BSC)	IBM S/34	1980s
75	Chittagong Port Authority (CPA)	IBM S/34	1980s
76	Community Development Library (CDL)	IBM 486, Apple Mac	1989
77	Bangladesh Civil Aviation Authority (BCA)	IBM S/36	1980s
78	National Press Club (NPC)	IBM 486	20-12-'94
98	BANBEIS	IBM 486 DX	1990s
99	Ministry of Women Affairs	Honeywell DPS 6/xx	1990s
100	Ministry of F/Affairs	IBM 386	1990s
101	National Health Library and Documentation Centre	IBM 386	1990s
102	Bangladesh Lutheran Mission	IBM 486 DX	1990s
103	Export Promotion Bureau	IBM S/36	1980s
104	Food for the Hungry In'tl	IBM 486 DX	1990s
105	Helen Keller International	IBM S/36	1990s
106	The Daily Star	IBM S/36, Apple Mac	1990s
107	The Bangladesh Observer	IBM S/36, Apple Mac	1990s
108	Children's Nutrition Unit	IBM 486, 386	1994
109	IPSA	IBM 486 DX	1990s
110	Bangladesh Small and Cottage Industries Corporation	IBM S/36, 486 DX	1990s
111	Bangladesh Academy for Rural Development (BARD)	IBM 386	
112	Bangladesh Project Management Institute (BPMT)	IBM 386	1990s
113	Bangladesh Public Administration Training Centre (BPATC)	IBM S/34 486, Dx2	1980s
114	Bangladesh Institute of Bank Management (BIBM)	IBM 386	1990s
115	Bangladesh Insurance Academy (BIA)	IBM 386	1990s
116	Bureau of Manpower Employment and Training (BMET)	IBM S/36	1990s
117	Caritas	IBM S/34	1990s
118	Bangladesh Centre for Advance Studies (BCAS)	IBM 386	1990s
119	Centre for Environmental Studies Research (CESR)	IBM 386	1990s
120	Centre for Integrated Rural Development for Asia and Pacific (CIRDAP)	IBM S/36	1980s
121	Institute of Nutrition and Food Science (INFS)	IBM 386	1990s
122	Micro Industries Development Assistance Society (MIDAS)	IBM 486	1990s
123	Association for Social Advancement (ASA)	IBM 486 DX1	1990s
124	CARE International Bangladesh	IBM 486 DX2	1980s
125	Goashahajjo Sangotha (GSS)	IBM 486 DX2	1990s

The Computer Centre of the Bangladesh University of Engineering and Technology (BUET) is one of the largest computer establishments in the country. The Computer Centre has been established in September 1979. The authorities of BUET institutions have taken an initiative in establishing this centre in 1968, when they got their first computer. The BUET started its computer applications by offering courses in numerical methods and computer programming acquiring its own machines in 1979. Its use is limited mainly to educational and training purposes, as well as research activities of the students and faculty members of the university. Other educational, governmental and financial institutions from the private sector also have access to them. "With the opening of the Computer Engineering Department in the Faculty of Electrical and Electronics Engineering (DEEE) and successful operation of the Computer Centre, the BUET is developing computer work-force in both hardware and software areas. The Department of DEEE and Computer Engineering have been offering courses on computer hardware, microprocessor and microcomputers, and advanced courses on software".⁽⁵⁾ Centre for Integrated Rural Development of Asia and Pacific (CIRDAP), Community Development Library (CDL), Info-Serve (a commercial institute) offer courses on application of CDS/ISIS in the library.

The Computer Centre is playing an important role to arrange educational and research programmes for graduate and postgraduate students of BUET and other institutions. It is offering training programmes as well as practicable facilities for mass people. It contributes special training facilities for government, semi-government and autonomous institutions. About 2600 people got their computer literacy from this centre. The Centre provides consultancy service to achieve system development of various organisations. Besides computer literacy programmes, it serves computing facilities to many organisations like Planning

5. Khan, M. Shamsul Islam. *op.cit.* p.36

Commission, Public Service Commission, Dhaka Electric Supply and Titas Gas, etc. The centre earns money providing training and consultancy services.⁽⁶⁾ The BUET Computer Centre, Institute of Business Administration of Dhaka University, Computer Centre of the North South University, and many other private and commercial institutions also offer courses in computer language and application. The Computer Centre of North South University has been offering a 4-years B.Sc course on computer science studies since 1992.⁽⁷⁾

Administrative and commercial applications of computers are also becoming very common in Bangladesh (see as shown in the *Table:9*) for data processing in the

Table- 9: Areas of Computer Use (General) in Bangladesh

Administrative	Budget and Accounts	Revenue & Taxes	Transportation & Communications	Financial Activities	Research and Education	Library & Information
Personnel administration by type and service	National annual budgeting	Income tax and recovery	Telephone billing	Banks & Banking	Water utilisation and distribution	Administrative works
Personal planning and control	Payroll	Property tax	Inventory of telephone stores	Banks loan and recovery statement	Hydrological survey and research	Processing
Recruitment records	Provident fund & Group insurance	Vehicles taxes	Radio & TV Licence/revenue records	Banking communications	Meteorological forecasting and monitoring	Information and documentation
Migration & immigrations report	Pension records/Accounts	Land revenue	TV Programming	ATM Services	Geological survey	Circulation control
Passport and visa report	Social insurance schemes	Commercial / Licence revenue	Postal saving and Life insurance record	Banking Statistics	Land records	Acquisition
Vehicle registration report		Customs and Excise duty etc.	Air Tickets and reservations	Life insurance Evaluations	Examination results and records	Publishing
Employment exchange activity		Revenue statistics	Railway-Air schedule and control	Stock and share market reports	Academic records	
Census activities: Housing, Population, Annual etc.		Municipal taxes billing	Cargo and passenger handling in airports	Cash flow forecast for profit evaluation	Teaching materials developments	
Family Planning			Cargo and Passenger handling in ports	Electricity and Gas billing	Applied research & evaluations	
Recording of criminal and subversive activities			Satellite and transmission		Statistical research and evaluations	
Industrial/Commercial sectors			Weather forecasting		Academic modeling	
			Newspaper industry		Admission control and records	
			Digital communication		Health and diagnostic activity	
			Desk top printing		Hospital management	

6. *BUET Computer Centre and computerisation. Computing*, April 1992. p.10.

7. *Ibid.*

offices and libraries. To date, 45 medium or larger-sized computer facilities have been or are in the process of being established in Bangladesh. It was showed that over 8,000 personal computers and word processors are being used at present by institutions and embassies in Bangladesh, compared to only 500 units in January 1987. Many individuals are also using personal computers and word processors at house.⁽⁸⁾

In Bangladesh computers are currently being used in the area of human resource development, R&D, data processing, management of data, inventory control, personnel record maintaining, production scheduling payrolls, financial and revenue accounting management information systems, creation of databases or data productivity, reports, creation of bibliographic databases for library and information services, etc.

Bangladesh has lagged behind in her progress towards modernising information facilities and services. She possesses the communication and information technology of radio and television which are of extreme importance for the access to information. These are used heavily to the country's information needs in agriculture, industries, food production, health, education, housing and social change. These provide information at a more basic level than that required by developed countries. Indeed, they are used as media for mass education and basic technical and vocational training. Print media are of little help where a large percentage of the population is illiterate. Radio and television are also used for providing entertainment. For example, we watched on our TV the live 1986 World Cup Soccer matches relayed to Bangladesh from Mexico via the *Betbunia* Earth Satellite station in Chittagong. We enjoyed Wills World Cup Cricket matches through Star TV Network from India and Pakistan in March-April 1996.

8. Khan, M. Shamsul Islam. *op.cit.*

National and international communication using telex, telegraph, facsimile, E-mail service is not uncommon in Bangladesh. Long distance telephone calls both within and outside Bangladesh is now possible using Subscriber Trunk Dialling (STD) and Nation-wide Dialling (NWD) facilities of Telecommunication Board. Some of the major libraries in the country use telephones, Fax, and E-mail facilities for the purpose of communication as well as for disseminating information to their clientele. These libraries have in their collections both print and non-print media, including video cassettes, sound recordings, various forms of micrographics, and the required equipment needed for their use. They also have a limited provision of photocopying and duplicating facilities.

Since the *Table-8* shows that the use of computers started in Bangladesh from 1964. But its applications in libraries have also been increasing since the mid-1980s as shown in the *Table-10*, though these are not as widespread as in developed countries or not even as in India. The libraries and information centres in Bangladesh have realised the value and importance of the application of new technologies in order to improve their services to users. As new technologies have

Table: 10: Microcomputer Systems and software used in the Libraries and Information Centres

SL No	Name of Library	Status of the Library	Package(s)	Initiation
1	Bangladesh Agricultural University Library (BAUL)	University Library	WP 5.1, CDS/ISIS	1994
2	Bangladesh Open University Library (BOUL)	do	WP 5.1	1995
3	Bangladesh University of Engineering and Technology Library (BUETL)	do	MSWORD WP 5.1, CDS/ISIS	1980s
4	Chittagong University Library (CUL)	do	WP 5.1, CDS/ISIS	1995
5	Dhaka University Library (DUL)	do	WP 5.1, CDS/ISIS	1994
6	Independent University, Bangladesh Library (IUBL)	do	WP 5.1, CDS/ISIS	1994
7	International University of Business Agriculture and Technology Library (IUBATL)	do	WP 5.1, MSWORD	1995
8	Jahangir Nagar University Library (JUL)	do	WP 5.1, CDS/ISIS	1995
9	North South University (NSU)	do	MSWORD, WP 5.1, Excel, CDS/ISIS, LAN, E-Mail, Internet	1992

SL No	Name of Library	Status of the Library	Package(s)	Initiation
10	Shahjalal University of Sc.& Tech. Library (SJUSTL)	do	WP 5.1, CDS/ISIS	1995
11	Scholastica	School Library	WP 5.1	1995
12	Bangladesh Central Public Library (BCPL)	Public Library	WP 5.1, CDS/ISIS	1995
13	Community Development Library (CDL)	Community Library	WP 5.1, CDS/ISIS, E.mail, Internet	1994
14	Bangladesh National Scientific and Technical Documentation centre (BANSDOC)	National Library	WP 5.1, CDS/ISIS	1988
15	National Health Library and Documentation Centre (NHLDC)	do	WP 5.1, CDS/ISIS	1990s
16	Agriculture Information Centre (AIC)	Special Library	WP 5.1, CDS/ISIS AGRIS	1989
17	Ain-O-SHalish Kendra Library (ASKL)	do	Windows 95* CDS/ISIS	1995
18	Atomic Energy Centre Library (AECL)	do	WP 5.1	1990s
19	Bangladesh Institute of Diabetes Endocrine and Metabolism Library (BIRDEML)	do	WP 5.1, CDS/ISIS Medline	1990s
20	Bangladesh Academy of Rural Development Library	do	WP 5.1	1995
21	Bangladesh Agricultural Research Institute Library (BARIL)	do	WP 5.1	1995
22	Bangladesh Bank Library (BBL)	do	WP 5.1	1990s
23	Bangladesh Chambers of Commerce and Industry Library (BCCIL)	do	WP 5.1, E-mail	1995s
24	Bangladesh Computer Council Library (BCCL)	do	WP 5.1	1990s
25	Bangladesh Development Studies Library (BIDSL)	do	WP 5.1, CDS/ISIS DEVINSA	1990s
26	Bangladesh Geological Survey Library (BGSL)	do	WP 5.1	1995
27	Bangladesh Institute of International Strategic Studies (BISSL)	do	WP 5.1	1990s
28	Bangladesh Rural Advancement Community Library (BRACL)	do	WP 5.1, CDS/ISIS	1990S
29	Bangladesh TV Library (BTVL)	do	WP 5.1	1990s
30	Centre for Integrated Rural Development of Asia and Pacific Library (CIRDAPL)	do	WP 5.1, CDS/ISIS	1980s
31.	DISC, ICDDR,B	do	WP 5.1, CDS/ISIS E-Mail, Internet	1980s
32.	Children's Nutrition Unit Library (CNUL)	do	WP 5.1, CDS/ISIS	1995

SL No	Name of Library	Status of the Library	Package(s)	Initiation
33.	External Relation Division Documentation Centre (ERDOC)	do	MSWORD, CDS/ISIS	1995
34.	Fisheries Research Institute Library (FRIL)	do	WP 5.1	1995
35.	Forest Research Institute Library, Ctg. (FRIL)	do	WP 5.1, CDS/ISIS	1995
36.	Gano Shahijya Shangstha Library (GSSL)		WP 5.1, CDS/ISIS	1995
40.	Micro Industries Development Assistance Society Library (MIDASL)	do	WP 5.1, CDS/ISIS	1995
41.	Ministry of Establishment Library (MOEL)	do	WP 5.1	1990s
42.	National Institute of Local Government (NILG)	do	WP 5.1 CDS/ISIS	
43.	National Institute of Population Research and Training Institute (NIPORTL)	do	WP 5.1, CDS/ISIS MEDLINE, POPLINE	1990s
44.	Press Club Library (PCL)	do	WP 5.1, Internet	1995
45.	SAARC Agricultural Information Centre (SAIC)	do	WP 5.1, CDS/ISIS	1989
46.	Square Pharmaceuticals Library (SPL)	do	WP 5.1, CDS/ISIS	1995
47.	The British Council (BC)	do	WP 5.1, ECCTIS, Lotus	1980s
48.	UNIC	do	MSWORD	1990s
49.	UNICEF Library	do	MSWORD	1990s
50.	United States Information Service (USIS)	do	MSWORD, WP 5.1	1990s

been introduced in Government, and semi-government, autonomous departments, NGOs and private sectors since 1968, libraries and information centres have started to use computer systems by the beginning of the 1980s. During my study it was found through the questionnaire survey that fifty libraries now use computers in some aspects of their services and fifteen are planning to do so in the near future. Most part of applications related to the organisation of materials either for accessioning, bibliographic searches or indexing of articles, etc. are using CD/ISIS, but cataloguing, circulation stock taking and other activities are not yet introduced in any of the library of Bangladesh.

However, among the fifty libraries one or two private universities, some government-controlled research, NGOs and specialised libraries and information centres have installed foreign (imported) hardware in spite of foreign exchange problem. Some of these hardware, used in certain organizations, have limited functional capabilities. Library oriented hardware or software is not manufactured in Bangladesh as yet, and is therefore, not available locally except UNESCO's CDS/ISIS probably the only software used in Bangladesh which is shown in the *Table-10*).

NATIONAL AND INTERNATIONAL NETWORK

Attempts have been made, from time to time, again by specialised libraries to contribute to existing international data bases at regional, national and international levels for networking. Examples⁽⁹⁾ are Agricultural Information System (AGRIS); Health Literature, Library and Information Service (HeLLIS);⁽¹⁰⁾ Development Science Information System (DEVSI) Asia-Pacific Information Network for Social Sciences (APINESS), Development Information Network for South Asia (DEVINSA); Information Network on Rural Development (INRD) and population Information Network (POPIN). In all these cases it has not been possible to develop an on-line database; information is being exchanged by way of floppy disks or CD ROM. "The librarians and the scholarly community in Bangladesh are aware of the need to develop an on-line national database of its research materials and exchange of information internationally. This is evident from the fact that on 23 May 1994 there was a workshop on

9. Bhatia, Kanta. A profile of Dhaka libraries. The Independent, 12 April 1995.

10. Haque, Md. Shamsul. Health information services in improving the health of the people of Bangladesh: resource sharing of the National Health Library and Documentation Centre. In: *National Seminar on "Preparing the libraries and librarians of Bangladesh for 21st Century: 26-28 December, 1993; souvenir*. Dhaka: Library Association of Bangladesh, 1993..p.

Electronic Networking in Asia held at ICDDR,B attended by 24 Bangladeshi delegates with two consultants from India”.⁽¹¹⁾ Also there was a National Seminar on *Preparing the Libraries and Librarians of Bangladesh for the 21st Century* held under the auspices of the Library Association of Bangladesh in 1993.⁽¹²⁾

There is an approved project, “Automation and Networking of Science and Technology Libraries in Bangladesh” to be executed under the guidance of BANSDOC. According to the Director of BANSDOC its implementation most likely will begin next year. This 25 million Taka Project will be executed in three phases. The first phase will concentrate on creating local databases at the following libraries: Bangladesh National Scientific and Technical Documentation Centre (as the central host), Dhaka University, Bangladesh University of Engineering and Technology, Bangladesh Council of Scientific and Industrial Research, Bangladesh Agricultural Research Council, Institute of Post Graduate Medicine and Research and National Health Library and Documentation Centre. The second phase will link these database through Public Switched Telephone Network with BANSDOC as the Central Coordinating Body to deal with different subject areas. The institutional libraries and information centres will be organised under each sector as the 3rd tier at the third phase of the policy.

It was proposed to link these centres directly and through the sectoral libraries and information centres to the centralised 1st tier mechanism. It should be noted here that the libraries are using the computer in some function or the others. However, emphasis was on the areas like as administrative jobs i.e. letter writing, work order issuing, etc., book ordering, accessioning, bibliographic or retrospective and indexing services, etc. as shown in *Table-12* and *Table-13 of Chapter Nine*. While a library uses computer in serial control only, another adds its application in

11. ICDDR,B. Annual Report 1995.

12. *National Seminar on “Preparing the libraries and librarians of Bangladesh for 21st Century: 26-28 December, 1993; souvenir*. Dhaka: Library Association of Bangladesh, 1993.

cataloguing and acquisition. A third, meanwhile, uses it in addition to these three functions to produce catalogue cards and as a word processor for administrative purposes. Some libraries are using the mother organisations' computer systems to produce lists of its holdings of serials or current subscriptions and to prepare a list of books to be purchased.

PROSPECTS

The revolution in new technologies are rapidly changing almost all aspects of human life in general. In Bangladesh, the printing and publishing industry is passing through a radical transformation. Telephones and telecommunications are going through a process of rapid change and modernisation to cope the growing demands of the public. The education and library services are yet to see much change, but change in these sectors are also bound to come if situations demand. Industry, agriculture, medicine, banking, and finance and various other services are likely to benefit tremendously from these developments.

The rapid and large scale dissemination of information have made it necessary to redefine the role of information in society. In earlier times, human settlements usually developed at places with good communication-such as on the banks of rivers or inter sanctions of roads. Trade and commerce was linked to mostly material goods and such communication centres facilitated trade and commerce with information. Today, with facilities of electronic communication, such limitations are no longer valid. Similarly, the distinctions between the city centre and suburb, or between the work place and the residence are being gradually obliterated. People no longer have to live close to the city centre for easy access to the place of work.

There was a time when a nation's resources were measured mainly on the basis of the crop lands, forest resources, minerals and energy resources it possessed. Today, information resources are rapidly becoming the prime sources of strength of a nation. Information is becoming the moving forces of technology which, in its turn, is the prime mover of the various production systems. Thus, the information systems are gradually becoming the nerve-centres of any society and its nation. Man is fast moving towards a form of civilisation where information will become the main raw material and a nation which lags behind in its mastery will for ever remain at a disadvantage.

The choice for Bangladesh is relatively limited. Bangladesh has a largely illiterate population, most of whom exist at the bare edge of survival. However, the new technology can be a powerful weapons to fight against the illiteracy and tool for the spread of information to the mass people how survive in a society. Bangladesh, as report of the World Bank, one of least developing countries of the world, will have to set its priorities for national developments in the light of the these consideration. The more quickly we integrate the NT into some of our library and information centres, as well as our production and management systems, the greater chances of accelerating our socio-economic development process in a sense.

There have ~~been~~ served major technological changes over the past 15 years. Now most microcomputers are 16 bits, this providing faster processing needs and increased main storage facilities. Also developments have taken place in mass storage devices such as Winchester Disk and CD-ROMs. These developments have also been reflected in Bangladesh. In many cases, people are awaiting for new versions for changing their old to new dimensions. Microcomputers are used for wide variety of purposes in libraries in Bangladesh. The trend is increasing day by day. To date, over 45 medium or large-sized computer facilities have been, or are

in the process of being established in Bangladesh. An estimate showed that over 5000 personal computers and word processors are being used by institutions and different foreign missions in Bangladesh, compared to only 500 units in January 1987. Many individuals also use personal computers and word processor at home and offices. The use of computers are also being increased in the library since 1990s. Leagate and Dyer⁽¹³⁾ divided the purposes in libraries into initial applications and 'subsequent development'. The initial applications includes: a. intelligent terminal access to on-line search services (those have these); b. intelligent terminal access to computer power within the organisation; c. use database management systems (DBMS) and other utilities; and d. do-it-yourself software.

Leagate and Dyer's subsequent developments are based on the introduction of software written specifically for library functions (e.g. Bookshelf, ECCTIS etc. used in The British Council and CDS/ISIS, a widely used microsoftware for library works in Bangladesh), and they split these into three areas:

- Single function, single user;
- integrated systems usually modular in design and providing the major library functions;
- extension of the above software to multi-user and network configurations.

As Kumar's description- "Within a decade computer technology has become an indispensable part of web that holds society together. The computer has social, cultural and economic impact on each of us."⁽¹⁴⁾ According to Branscomb, It can be said that "computers are being used in banks, airlines, railways, coal companies, chartered accountant's firms, hospital and so many other places. The days are not far off when computers will replace the typewriter"⁽¹⁵⁾

13. Leagate, Peter and Dyer, Hillary. The microcomputer in the library: I-introduction. *Electronic Library*, 1985 Jul; 3(3): 200-9.

14. Burton Paul F. Micro computer application and the use of data management software. ... 1982 Jul; 16(3): 180-90.)

15. Branscomb, LM. Electronics and computer: an over view. *Science*, 1982 Feb 12:755.

The use of CD-ROM or *Compact Disk-Read Only Memory* devices are being increased in libraries, on which information can not be recorded over or removed.

A CD-ROM (with a diameter of 12 cm and thickness 1.2 mm) can hold about 600 Mbytes and once the master disk has been made, copies can be made easily and comparatively cheaply. The disk is 'read' by using a special 'player' incorporating a laser device. Such players can now be linked to microcomputers such as the IBM- PC, thus enabling information-retrieval software on the semicomputer to be used to search bibliographic, or other databases stored on the CD-ROM. CD-ROM developments are really only part of the general developments in digital optical recording devices. As such the use of CD-ROM on various subject areas (MEDLINE, DEVINSA, AGRIS, etc.) have been or are taking a important place in some of the special libraries in Bangladesh. AT PRESENT 13 (14.1 %) of responding libraries are using CD-ROM and 17 (18. 5 %) indicated they have a plan to extend their services with CD-ROM facilities on their relevant subjects.

-Local Area Network (LAN) is a means of linking various computers and related equipment within one building or site. The North South University in this regard has been established an example as well as acted as a pioneer being set-up a LAN in the library from April 1996.

-Electronic Mail (E.mail): In the last 2 year (i.e. from the end of 1994) private electronic mail systems have been set-up in Bangladesh which offers to subscribers a possibility of leaving messages in an electronic 'pigeon hole' for another subscriber to collect at a convenient time. In Bangladesh, very few libraries have expended their services through E.mail communications.

Since 1985, Fax is being used as a commercial data and information transmission in Bangladesh. Probably, after 1995, a very few library authority have been to use

of Fax machine in the library. One of the best example is North South University Library in Bangladesh which installed Fax for dissemination of information to its clientele at their door steps since the end of 1992. We are fortunate that there is no opposition in the field of library and information services to the use of computers, though some people have wisely cautioned against the possible indiscriminate use of these machines which may result in loss of employment to some library staff and prove to be economically hazardous. Those who have gone in for the use of new technologies, had said clearly that, they opted for the use of new technologies only when they were convinced of its cost-effectiveness. Unless the job management is convinced of the costs-benefits, they are not going to approve the proposal for the application and use of new technologies.

Recently, the IBM world Trade Corporation showed an interest in establishing a regional information network. This partnership programme envisaged a larger computer centre in Dhaka with links to the Asian Institute of Technology (AIT), Bangkok.⁽¹⁶⁾ There are also little products of establishing computer-based communications links with other international systems for on-line database searching for at least by the 2000. On the other hand, with the decrease in sincerity and hard work in the work force, in general, the importance of new technologies are increasing. There has been a growing awareness among the library personnel about the potentiality of new technologies and their use in library and information centres. When we considered the Bangladeshi environment, "we have to discuss in terms of the government, the people, and the library situation."⁽¹⁷⁾

We are indeed very fortunate to have a government that has a progressive outlook

16. Khan, M Shamsul Islam. *Developments in new information technologies and their application and prospects in Bangladesh*. *Media Asia*, 1989; 16(1):35.

17. Kumar, PSG. *op.cit.* p.313.

We are indeed very fortunate to have a government that has a progressive outlook and views our needs in a correct perspective. The Government of Bangladesh recently took a high level decisions to computerise as far as possible work of different administrative set-ups, and to develop databases and management information systems to accelerate the decision-making process.⁽¹⁸⁾ For example the ministry of Education has started creating a databank with information from all schools, Madrashas, colleges and other educational institutions. Many government NGOs, research organisations, private Hospital voluntary agencies of the country are also planning to automate their activities and services. To popularise the application of computers at all levels and to hasten the automation process, the Government of Bangladesh formed, a high-power National Computer Council (BCC) in 1988 under the Ministry of science and technology. BCC was formed by an act of parliament for such a national strategic role.⁽¹⁹⁾

Public opinion regarding use of new technologies in Library and information centres in Bangladesh is not very clear. The absolute ignorance is of the people in some cases has hindered the implement of the policy. Very small fraction of the total population is very much in favour of application and use of new technologies in Libraries and information work. This group of people are quite aware of the qualitative changes that can result with the use of new technologies. This is the reason why the top management of some of organisations has approved the proposal of the application and use of new technologies ever without considering the costs involved. Services like CAS, SDI, or bibliographic searching facilities have made tremendous impact on that small group people.

18. Khan, M Shamsul Islam. *op.cit.*

19. *Information Technology and National Development: editorial, Monthly Computing*, January 1994: 5-7. *See also*: National science and technology information policy: Bangladesh. In: proceedings of the seminar on the overview of the work plan for the implementation of the National Science and technology information policy: 19-20 October, 1988. Dhaka: BANSDOC, 1988. p.7.

In connection with new technologies in Library and information centres, it is worth to mention that very few library and information centres have used new technologies and works in the field of library and information science. It is very prospective that major libraries of country are planning to use new technologies in their services. To promote and to encourage the use of new technologies in library and information services, a national seminar on the modernisation of library science education and library services in the Bangladesh was organised in January 1987 by the library Association of Bangladesh.

BANSDOC prepared the Bangladesh National Science Technology Policy (NASTIP) in 1988. But the Government did not yet give due recognition to it. The aims and objectives of the policy are to develop national database of both conventional and non-conventional scientific and technological literature, develop a database of science and technology, to link national libraries, university libraries and research libraries through a telecommunication systems with the BANSDOC, to promote the use of computers, CD-ROMs, telefax, and etc., to organize long and short training programmes in use of new technologies, and to develop a competent and skilled information services manpower to undertake the automation programme. The policy is definitely very important for the development and the use of new technologies in Bangladesh. But unlikely such an important policy has not yet been recognized and executed in Bangladesh.

Another 3 year project has been undertaken by the BANSDOC to implement Bangladesh's first on-line library information network-Bangladesh National Scientific Library and information network (*BANSLINK*) and is scheduled to be completed by mid 1998.⁽²⁰⁾ The project is divided into three major phases, and will eventually connect the major science and technology libraries of 15 universities and research institutions together to a versatile library information and retrieval network. A network service centre has been established and has been made operational to develop custom *BANSLINK* internet-capable services and database applications. The Network Service Centre also acts as a maintenance organisation and co-ordination point for the project. The libraries of Bangladesh does not have real-time Internet connections yet. And at present there is only a limited number of off-line, Internet service providers providing basic e-mail and local internet services. *BANSLINK* is, therefore, connected to the global internet via a local service provider, and regularly exchange e-mail with outside world, serving as a e-mail gateway for all of its client organizations.

During this project the following organisations will come under the service converge of *BANSLINK*, and thorough their respective local gateways, it is hoped that more departments and resource persons will be able to be reached through E-mail and Internet services (in alphabetical order):

Agricultural Information Centre

Bangladesh Atomic Energy Commission Library

Bangladesh Council of Scientific and Industrial Research Library

Bangladesh University of Engineering and technology Library

Chittagong University Library

Dhaka University Library

20. Project Office. *Automation and networking of science and technology libraries in Bangladesh*: memo. 96A. Doc 4 February, 1996. Dhaka: BANSDOC, 1996. P.1.

Institute of Post Graduate Medicine and Research Library
Jahangirnagar University Library
Khulna University Library
Ministry of Science and Technology Library
Mymensingh University Library
National Health Library and documentation Centre
Planning Commission Library
Rajshahi University Library
Shahjalal science and Technology University Library

In most cases, it is known that the introduction of BANSLINK services will be the first wide area network project of any kind to be implemented at the client organisations. All client organisations are being provided with custom configured multi-user host servers, terminals and associated network equipment. Upon completion, it is planned that the following services will be made available to the general public at each client organisation:

- * Integrated Library Management System
 - * Access by modem
- * Inter-Library Loan System
 - * CD-ROM support
- * On-line Public Access Catalogue
 - * Information/KWIC Search
 - * WWW Support
 - * Mailing List Support
- * ASCII Terminal Support
- * Computer Conferencing (News groups)

Although a majority of the respondents nonetheless ranked the existing level of application and use of new technologies as 'good', yet there was a clear division of opinion on future prospects of new technologies in the libraries and information centres of Bangladesh.

Lots of progress is being made in the application and use of new technologies in the libraries in spite of the daunting difficulties enumerated above. Some respondents indicated the presence of experts or trained technicians in their libraries who handled users' problems. These experts are either members of the staff of the library, or of the parent institution or outsider. They rectify problems immediately or, when it is difficult to do so, vendors or outside experts are called in. These respondents claimed, more over, that there are agreements for after sales maintenance with vendors of equipment distributed in the country. Minor problems, such as the inability of users to get microforms on to reader-printers, are solved by library staff who either instruct them or do it for them. Further, if any user complains of eye strain when reading microforms, he is encouraged to be calm as it is expected that he or she will become accustomed to the machine.

It is clear from the foregoing study experiences and findings relating to use of new technologies in Bangladesh that we have still a long way to gain reaping the benefits of new technologies in libraries and information centres. Socio-economic priorities and lack of appropriate technological infrastructure will preclude the establishment of on-line library networking for years to come, even though such networks provide the most effective means for resource sharing. The existing pattern of application and use of new technologies will continue to be one where the stand-alone application will predominate. Of course, there is doubt that adequate expertise and equipment in the library and areas of new technologies are not available for the synergistic development of viable automated systems for the libraries of Bangladesh. What

seems to be lacking is the explicit support, sanction and well defined and agreed priorities, policies and plans for the development of automated systems for libraries of Bangladesh.

The libraries of Bangladesh have a rich background since 1854. The collections of rare books, manuscripts and reports of various departments of government and agencies are also available with their libraries. But these collections are not well organised; there are serious problems of space, lack of trained staff, equipment, initiative and funding. Some important archival materials are disintegrating for lack of preservation facilities. Some progress has been made in creating local computer database and sharing and exchanging of information at the local, but it is not enough. No systems as of now is on-line; information is shared through exchange of floppy disks or CD-ROM.

These programmes, while providing wider access to library resources, will be cost effective. The national database will facilitate research searing in many areas. The system will eliminate the need for duplicate holdings. It will be essential for inter library loan services. It can also be used for copulative cataloguing by various libraries, which will mean that one title need be catalogued only once. Savings from implementation of these measures could be used to purchase additional research materials. The national database is a reasonable, achievable, invaluable national asset which will becoming point of pride for Bangladesh in the future.

STATISTICAL FINDINGS OF THE STUDY

CHAPTER NINE

STATISTICAL FINDINGS OF THE STUDY

Information resources are of immense value for any study and research, because the utmost important factor of information is the information resources. "It is well recognised that no research and advance studies can successfully be carried out without using appropriate information resources materials. Most libraries and information centres provide such service with varying degrees of effectiveness and efficiency."⁽¹⁾

Information whether social, economic, scientific or technological, covering all facets of Human life and activities is a key national resources and its importance is universally recognised. Consequently, a coordinated and well-planned approach to the information handling has become imperative. The need for information resources are estimated to be growing at a rate faster than that of world economy.⁽²⁾ "Every year the scientific-technical community increases size by about 7 percent, its supply of information by 11 percent. It is estimated that in 15 years' time, including the foreseeable development in third world countries, there will be 30 to 35 million scientists, economists, technicians, etc., producing information, the annual output

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1. Neelameghan, A and Sulaiman, Zainon. *A prototype for an integrated database for IMIN*. In: *The Third Congress of Muslim Librarians and Information Scientists: COMLIS III; papers*. 24-26 May 1989. Turkey: Ministry of Culture, 1989. p.54.
 2. Bavakutty, M. *Role of National libraries in International Muslim Information Network*. In: *The Third Congress of Muslim Librarians and Information Scientists: COMLIS III; papers*. op.cit. p.81.

being 12 to 14 million documents.”⁽³⁾ An integrated information infrastructure-linking library systems, computer based data centres with public, academic, special libraries, community information centre-is, in a sense, the very foundation of the growth and development of a country, for useful and efficient service, a number of national institutions designed to serve as information resource centres in the country. Information has always been integrated to socio-economic and all other human activities. Information-processing is fundamental to consciousness, which is the distinctive characteristic of humanity. There are various distinct types of information processing, which may be carried out either by an unaided human being or with the aid of tools and technology.

Technology has assisted some of these categories of the activity at least since visual and non-verbal systems (writing, flags, drums) have been developed. More recent technological achievements offer tremendous scope for the transformation of traditional ways of carrying out these activities. *New Technology* (NT), largely based on digital information processing via microelectronics and micrographics and optronics, involves dramatic increases in the application of technology to all the aspects of information processing mentioned above. In its short history, new technologies have achieved tremendous improvements in physical performance. We will all be familiar with exponential trend lines that are revealed when features like chip density, random access memory (RAM) capacity, or channel capacities are plotted over time.

Libraries and information centres in Bangladesh have realised the value and importance of the application of new technologies in order to improve their services to users. As new technologies have been introduced in government, and semi- government, autonomous departments, NGO and private sectors since 1968, libraries and information centres have started to use computer systems by the beginning of the 1980s.

3. Artz, Helmut. Planning of national over all documentation, library and archives infrastructure. Paper presented for the FID to the UNESCO Inter-Governmental Conference on the Planning of National Documentation, Library and Archives Infrastructure. Paris: UNESCO, 1974. p.9-10.

Since then some of the important libraries and information centres of Bangladesh have been using new technologies in their services and they are successful in their attempts. Users are also satisfied with their use and services. Other libraries who had not yet introduced new technologies are strongly feeling the necessity of the application of new technologies in satisfying the demands of their clientele. It can be said that all the participated libraries in the survey of this study desires to introduce new technologies in their services. But in the context of Bangladesh it is not very easy job. Bangladesh has been suffering from many acute problems as stated by the respondents in the questionnaire. Political situation is almost unstable. Economic condition is no doubt poor. All and above these factors there are so many vital problems in the application of new technologies.

Some of the respondents mentioned that without considering due attention to this problems it will be futile and unwise to take the venture of introducing new technologies in the libraries and information services of Bangladesh. As such in the *Chapter Ten* the problems were thoroughly discussed. But the librarians will be benefited by reading those problems. Whenever there is problems there must be solutions. So the important and possible solutions to the problems in the context of socio-politico-economic and cultural context are also suggested. As problems are acute and thought provoking in the same way the solutions are also very important and demands considerations. This basic survey was initiated to study the extent of application of new technologies in libraries and information centres of Bangladesh.

The main objectives of the present study were to look at the extent of application and use of new technologies in library functions and services; problems and prospects with solutions and future plan of action. Accordingly a short questionnaire consisting of self questions on the application and the use of new technologies in the libraries and information centres was devised to determine the following in short: whether or not

the library uses new technologies; what are the specific functions/area where the new technologies are used; what were the problems hindering the use of the new technologies in the libraries; what are the possible solutions to those problems; and do the library has any plan to use the new technologies in future. Personnel interviews, and field visits to libraries were also undertaken to gather the kind of data that otherwise can not be obtained.

The researcher adopted various important and related methods for collecting and analysis of materials. These were elaborately stated in the *Chapter Seven*. In the methodology, statistical method is a very important one for a good research. Asd such in the following pages I tried my best to explain what I found in the form of statistics. As a part of the study, the population consists of 132 libraries of all types. Academic libraries (e.g. Universities, colleges, *madrashas*, and schools), public libraries, national libraries, community libraries and special libraries were selected randomly. A sample of school libraries was selected at random basis where at least one computer has been installed. Of all libraries surveyed, 92 (69.7%) of them responded as shown in *Fig.11* and the ratio of representative respondent was found as shown in the *Fig.12*.

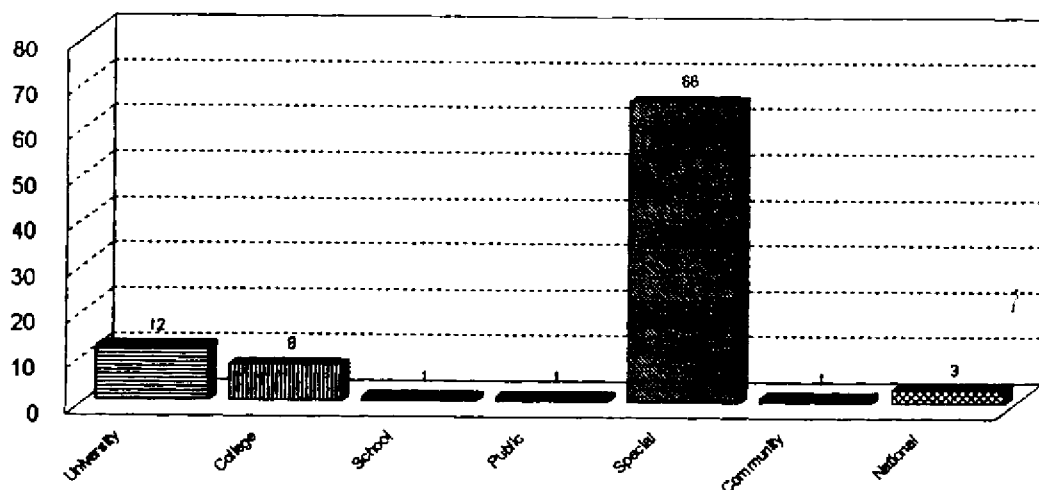


Fig.11: Number of representative respondent (n=92)

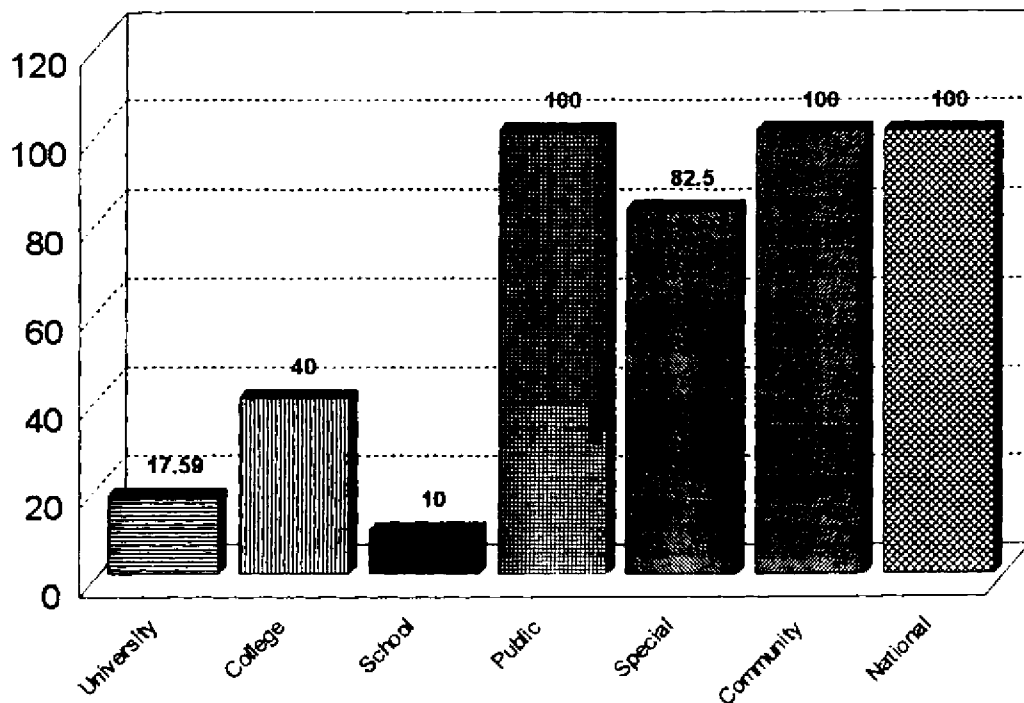


Fig.12: Percentage of representative respondents

Table-11-A and Table-11-B show the number of libraries, by type, the number and percentages of responses, and the number and the percentages of libraries using new technologies.

Table-11-A: Responding libraries and use of new technologies.

Type of Library	Surveyed	Responded		Computer		CD-ROM		E-mail	
	Total	Total	%	Total	%	Total	%	Total	%
University	17	12	70.6	10	83.3	3	25	3	25
College	20	8	40	0	0	0	0	0	0
School	10	1	10	1	10	0	0	0	0
Public	1 (66)	1	100	1	100	0	0	0	0
Community	1 (40)	1	100	1	100	1	100	1	100
Special	80	66	82.5	36	54.5	7	10.6	5	7.6
National	3	3	100	2	66.7	2	66.7	1	33.3
TOTAL	132	92	69.7	50	54.3	13	14.1	10	10.9

The responded libraries have been using telephones, Fax, and E.mail facilities for the purpose of communication as well as for dissemination of information to their clientele. Details of the services are shown in the *Table-11-B*. These libraries have in their collections both print and non-print media, including video cassettes, sound

Table-11-B: Responding libraries and use of new technologies

Type of Library	Surveyed	Responded Fax			Copier		CDS/ISIS		LAN	
	Total	Total	Total	%	Total	%	Total	%	Total	%
University	17	12	1	8.3	12	100	7	58.3	1	8.3
College	20	8	0	0	1	14.3	0	0	0	0
School	10	1	0	0	0	0	0	0	0	0
Public	1 (66)	1	0	0	1	100	1	100	0	0
Community	1 (27)	1	1	100	1	100	1	100	0	0
Special	80	66	3	4.5	32	48.5	16	24.2	0	0
National	3	3	1	33.3	3	100	2	66.7	0	0
TOTAL	132	92	6	6.5	50	54.3	27	29.3	1	1.1

recordings, CD-ROMs (both text and sound), various forms of micrographics, and the required equipment needed for their use. They also have a limited provision of photocopying duplicating facilities. Analysing the responses to the questionnaire along with data gathered from field visits to libraries those have been using the new technologies, and personal interviews with librarians, it is revealed that the new technologies are being used in the functions collectively mentioned in *Table-12* and *Table-13*.

Table-12: Analysis of Computer used in Library Services

#	Name of Library	Administration	Book Ordering	Accession	Cataloguing/Classification	Circulation	Serial Control	Stock Taking	Indexing	Bibliographic search	Retrospective Search	Total Operations
1	AIC	Y	n	n	n	n	n	n	Y	Y	Y	4
2	ASK, L	Y	Y	Y	n	n	n	n	Y	Y	Y	6
3	BARIL	Y	Y	n	n	n	n	n	n	n	n	2
4	BCC, L	Y	n	n	n	n	n	n	n	n	n	1
5	BAU, L	Y	Y	Y	n	n	Y	n	Y	Y	Y	7
6	BB, L	Y	Y	Y	n	n	n	n	n	n	n	3
7	BCPL	Y	Y	Y	n	n	n	n	Y	Y	Y	6
8	BCCI, L	Y	n	n	n	n	n	n	n	n	n	1
9	BIDS, L	Y	Y	Y	n	n	Y	n	Y	Y	Y	7
10	BISS, L	Y	n	n	n	n	n	n	n	n	n	1
11	BIRDEML	Y	Y	Y	n	n	Y	n	Y	Y	Y	7
12	BANSDOC	Y	Y	Y	n	n	Y	n	Y	Y	Y	7
13	BRAC, L	Y	Y	Y	n	n	n	n	Y	Y	Y	6
14	BTV, L	Y	n	n	n	n	Y	n	Y	Y	Y	1
15	BUET, L	Y	Y	Y	n	n	n	n	Y	Y	Y	6
16	BC	Y	n	n	n	n	n	n	Y	Y	Y	1
17	CIRDAP, L	Y	n	n	n	n	n	n	Y	Y	Y	4
18	CNU, L	Y	Y	Y	n	n	n	n	Y	Y	Y	6
19	CU, L	Y	Y	Y	n	n	n	n	Y	Y	Y	6

#	Name of Library	Admini- stration	Book Order- ing	Acce- sion	Cate- loguing/ Classi- fication	Circu- lation	Serial Control	Stack Taking	Indexing	Biblio- graphic search	Retros- pective Search	Total Opera- tions
20	CDL	Y	Y	Y	n	n	n	n	Y	Y	Y	6
21	DU, L	Y	n	n	n	n	Y	n	Y	Y	Y	5
22	DISC, ICDDRB	Y	Y	n	n	n	Y	n	Y	Y	Y	6
23	ERDOC	Y	Y	Y	n	n	n	n	Y	Y	Y	6
24	FRIL	Y	Y	Y	n	n	n	n	Y	Y	Y	6
25	FRIL, Ctg.	Y	Y	Y	n	n	n	n	n	n	n	2
26	GSS, L	Y	Y	Y	n	n	n	n	Y	Y	Y	6
27	GSB, L	Y	n	n	n	n	n	n	n	n	n	1
28	GCC	Y	n	n	n	n	n	n	n	n	n	1
29	IUB, L	Y	Y	Y	n	n	Y	n	Y	Y	Y	7
30	IPSA, L	Y	n	n	n	n	n	n	n	n	n	1
31	IUBAT, L	Y	Y	Y	n	n	n	n	Y	Y	Y	6
32	ICTVTR, L	Y	Y	n	n	n	n	n	n	n	n	2
33	JU, L	Y	Y	Y	n	n	n	n	n	n	n	3
34	M/O Est L	Y	Y	n	n	n	n	n	n	n	n	2
35	MIDAS, L	Y	Y	Y	n	n	n	n	Y	Y	Y	6
36	NAEM, L	Y	Y	Y	n	n	n	n	Y	Y	Y	6
37	NILG, L	Y	Y	Y	n	n	n	n	Y	Y	Y	6
38	NHLDC	Y	Y	n	n	n	Y	n	Y	Y	Y	6
39	NIPORT, L	Y	Y	Y	n	n	Y	n	Y	Y	Y	7
40	NSU, L	Y	Y	Y	Y	n	Y	n	Y	Y	Y	8
41	BOU, L	Y	n	n	n	n	n	n	n	n	n	1
42	PC, L	Y	n	n	n	n	n	n	n	n	n	1
43	SAIC	Y	Y	Y	n	n	Y	n	Y	Y	Y	7
44	Scholastica	Y	n	Y	n	n	n	n	n	n	n	2
45	SJUST, L	Y	Y	Y	n	n	n	n	n	n	n	3
46	SP, L	Y	n	Y	n	n	n	n	Y	Y	Y	5
47	UNESCO	Y	n	n	n	n	n	n	n	n	n	1
48	UNIC	Y	n	n	n	n	n	n	n	n	n	1
49	UNICEF, L	Y	n	n	n	n	n	n	n	n	n	1
50	USIS	Y	n	n	n	n	n	n	n	n	n	1
TOTAL		50	31	26	1	0	12	0	28	28	28	202

Y = Existing n = Not existing

Table-13: Analysis of Computer used in Library for documentation works and services

#	Name of Library	CAS	SDI	CD-ROM	E-mail	CDR/ISIS	4-Base	Ind-ing	Abstr-act	Bibliographic Search	Trans-lation	Photo-copy	Fax	Pub.	Total Operations
1.	AIC	Y	Y	Y	n	Y	Y	Y	Y	Y	n	Y	n	Y	10
2.	ASK, L	Y	Y	n	n	Y	Y	Y	Y	Y	Y	Y	n	Y	10
3.	BARIL	Y	n	n	n	n	n	Y	n	n	n	Y	n	n	2
4.	BCC, L	n	n	n	n	n	n	n	n	n	n	Y	n	n	1
5.	BAU, L	n	n	Y	n	Y	Y	Y	n	Y	n	Y	n	n	6
6.	BB, L	Y	n	n	n	n	n	n	n	n	n	Y	n	n	2
7.	BCPL	n	n	n	n	Y	Y	Y	n	Y	n	Y	n	n	5
8.	BCCL, L	n	n	n	Y	n	n	n	n	n	n	n	n	n	1
9.	BIDS, L	Y	Y	Y	Y	Y	Y	Y	Y	Y	n	Y	n	Y	11
10.	BISS, L	Y	Y	n	n	n	n	n	n	n	n	Y	n	n	3
11.	BIRDEM, L	Y	n	Y	n	Y	n	Y	n	Y	Y	Y	Y	n	6
12.	BANSDOC	n	n	n	n	Y	Y	Y	n	Y	n	Y	Y	n	7
13.	BRAC, L	n	n	Y	n	Y	n	Y	n	Y	n	Y	Y	n	6
14.	BTU, L	n	n	Y	n	Y	n	n	n	n	n	Y	n	n	1
15.	BUET, L	n	n	Y	Y	Y	Y	Y	n	Y	n	Y	n	n	7
16.	BC	n	n	Y	Y	n	Y	n	n	n	n	Y	Y	Y	6
17.	CIRDAP, L	Y	n	n	n	Y	n	Y	n	Y	n	Y	n	Y	6
18.	CNU, L	Y	Y	n	n	Y	n	n	n	Y	n	Y	n	Y	6
19.	C U, L	n	n	n	n	Y	n	Y	n	Y	n	Y	n	n	4
20.	CDL	Y	n	Y	Y	Y	Y	Y	n	Y	Y	Y	Y	Y	11
21.	DU, L	n	n	n	n	Y	n	Y	n	Y	n	Y	n	n	4
22.	DISC, ICDDR	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	n	Y	12
23.	ERDOC	n	n	n	n	Y	n	Y	n	Y	n	Y	n	n	4
24.	FRIL	n	n	n	n	Y	n	Y	n	Y	n	n	n	n	3
25.	FRILONG	Y	n	n	n	n	n	n	n	n	n	Y	n	n	2
26.	GSS, L	n	n	n	n	Y	n	Y	n	Y	n	Y	n	n	4
27.	GSB, L	n	n	n	n	n	n	n	n	n	n	Y	n	n	1
28.	GCC	n	n	n	Y	n	n	n	n	n	n	Y	Y	n	3
29.	IUB, L	n	n	n	Y	Y	n	Y	n	Y	n	Y	n	n	5
30.	IPSA, L	n	n	n	n	n	n	n	n	n	n	Y	n	n	1
31.	IUBAT, L	n	n	n	n	n	n	n	n	n	n	Y	n	n	1
32.	ICTVTR, L	n	n	n	n	n	n	n	n	n	n	Y	n	n	1
33.	JU, L	n	n	n	n	Y	n	Y	n	Y	n	Y	n	n	4
34.	M/O Ext, L	n	n	n	n	n	n	n	n	n	n	Y	n	n	1
35.	MIDAS, L	Y	n	n	n	Y	n	Y	n	Y	n	n	n	n	4
36.	NAEM, L	n	n	n	n	Y	n	Y	n	Y	n	Y	n	n	4
37.	NILO, L	n	n	n	n	Y	n	Y	n	Y	n	Y	n	n	4
38.	NHLDC	n	n	n	n	n	Y	n	n	Y	n	Y	n	n	4
39.	NIPORT, L	Y	Y	Y	n	Y	Y	Y	Y	Y	Y	Y	n	Y	11
40.	NSU, L	Y	Y	Y	Y	Y	Y	Y	n	Y	Y	Y	Y	Y	12
41.	BOU, L	n	n	n	n	n	n	Y	n	n	n	n	n	n	1
42.	PC, L	n	n	n	n	n	n	Y	n	n	n	n	n	n	1
43.	SAIC	Y	Y	Y	n	Y	Y	Y	Y	n	n	n	n	n	7
44.	Scholesma	n	n	n	n	n	n	Y	n	n	n	n	n	n	1
45.	SIUST, L	n	n	n	n	n	n	n	n	n	n	Y	n	n	1
46.	SP, L	n	n	n	n	Y	n	Y	n	n	Y	n	n	n	3
47.	UNESCO	Y	n	n	n	n	n	n	n	n	n	n	n	n	1
48.	UNIC	Y	n	n	n	n	n	n	n	n	n	n	n	Y	2
49.	UNICEF, L	Y	n	n	n	n	n	n	n	n	n	n	n	Y	2
50.	USIS	Y	Y	n	Y	n	n	n	n	n	n	Y	n	Y	5
TOTAL		20	10	13	10	27	14	30	6	26	7	38	6	13	229

Y = Existing n = Not existing

This study has revealed that various computers are being used for library and documentation work in Bangladesh. Most of these are forth generation computers. Of

late, many libraries have started developing mini-computer-based system. Only 3 of them are providing terminal facility to their users for carrying out searches. North South University (NSU) Library has established a Local Area Network (LAN) for the users within the university.

The CD-ROM technology is quite popular, only a few libraries and information centres have installed the facilities, and offer services from the CD-ROM databases. Result of this survey shows that the CD-ROM facilities and databases in electronic formats are available in 13 libraries and information centres among the respondents, the list of which is given in the *Table-13*. DISC and other 7 Asian organisations have been participating in CD-ROM project, called AHEAD (Asian Health, Environmental and Allied Databases). The organisations have been contributing their databases to produce the Asian CDs. This is the first attempt to produce CDs from Asia. IDRC, Canada, has been providing financial assistance to this 6-year project. There are five commercial enterprises, namely Agni, Drik, Prothesta, Information Services Network, and Grameen Bank have been marketing the E.mail system in country. So far, only 10 libraries and information centres have installed E.mail facilities, which is given in the *Table-13*. Lately it is known that North South University Library, Community Development Library and DISC (ICDDR,B) have installed Internet connections to give services to their respective beneficiaries.

Many libraries and information centres prefer PASCAL language with CDS/ISIS for their operations. This appears to be easy for use and suited for library work. The choice of the language depends on the hardware and programmes available locally and at a cheap price. Most software packages used in the libraries, were imported except the Bangla software. Locally available packages are not suitable for use in library operations. Many of the libraries using ready-made packages felt that available packages were neither suited to their specific needs nor economical. They^{are} of the

opinion that 'tailor-made' programmes suited to their needs will be efficient and economic. However, other technologies are also being used for information handling and transmission in a few libraries and information centres in Bangladesh.

From all the respondents' response and literature reviewed it can be observed that the attention given to application and use of new technologies in Bangladesh is mainly noticeable in special libraries with in the research institutions, closely followed by university libraries and little efforts of the libraries of NGO, both national and international bodies of Bangladesh. School and college libraries have fallen into the least position in the race towards use of new technologies. It is needless to mention that the library of North South University, a first private university in Bangladesh, that has had the greatest success in use of new technologies with its operations, evidenced by the complete of computerization of card catalogue and removed the boxes from the library in January 1996.

It should be noted here that the libraries are using the computer in some function or the others. However, emphasis was on the *six areas* (see *Table.16*). While a library uses computer in serial control only, another adds its application in cataloguing and acquisition. A third, meanwhile, uses it in addition to these three functions to produce catalogue cards and as a word processor for administrative purposes. Some libraries are using the mother organizations' computer systems to produce lists of its holdings of serials or current subscriptions and to prepare a list of books to be purchased. It has also been observed during study that the level of use of technologies in libraries and information centre is very low. Where ever the computers and other technologies have been used, these are mainly used for information storage and retrieval and for word processing work. *Table. 9.6* shows that the CD-ROM facilities are available only in few libraries, and the services have been offered in a limited scale Except few organizations, the use of computers for acquisition, processing, circulation, serial controls, accounting, publishing, and administration is almost absent.

During the study, some experiments conducted at the few libraries and information centres demonstrated the feasibility of the use of new technologies in libraries and information works in Bangladesh. However, many of these experiments were not brought into regular operation. After initial experimentation, many of them were found either not using new technologies or abandoned their projects. The reasons are numerous-lack of financial resources, no proper support from authorities, changes in personnel, etc. None of these experiments tried to study economics of use of new technologies. Many did not bother about the evaluation of the automated services compared to manual systems. Almost all the experiments centred on solving simple problems, using in-house hardware, simple software packages and other available technologies. Eleven out of 50 have computerized 8-10 operations. Sixteen out of 50 have computerized 11-20 operations. Thirteen out of the 50 libraries have computerized for 2 to 3 operations and 12 out of 50 have computerized 4-7 library operations. NSUL, BIDSU, NIPORTL, CDL, BANSDOC, DISC, ICDDRDB, ASKL, CNUL, SAIC, ETC., have not only taken the lead in introducing computerization, but also tried to evolve a comprehensive automated system with other new technologies. The list of 50 libraries of the total number of operations shown in *Table-14*.

Table-14: New Technology used in library operations

SL.NO.	Range of Operations	Number of Libraries	Percentage of usage (%)
01	11 - 20	16	32
02	8 - 10	11	22
03	4 - 7	12	24
04	2 - 3	12	24

Administrative operation has drawn more attention of the librarians in the very few libraries. This is followed by photocopying services, book ordering, indexing, bibliographic services CDS/ISIS-based processing, accessioning, current awareness services (CAS), and abstracting services, SDI, E.mail, Fax and cataloguing and card-

producing operations. The operations are shown in the *Table-15 and Table-16* showing the numbers with percentage.

Table-15: Computer used for library operations

Sl. No	Library operation	No. of library Used	Percent (%)
1	Administrative works	50	100
2	Accessioning	26	52
3	Indexing	28	56
4	Bibliographic services	28	56
5	Book ordering	31	62
6	Serial control	12	24
7	Retrospective search	28	56
8	Cataloguing and classification	1	2
9	Stock taking	nil	0
10	Circulation	nil	0

In the field of documentation works, CDS/ISIS based processing is the increasing activity in the responding libraries. Close to this is indexing, bibliographic and current awareness, CD-ROM searches, publications, abstracting, SDI, translations, and then E-mail, and Fax services. These activities are followed by bibliographic (retrospective) search, dBase and referral services are shown in the *Table16*.

Table-16: Computer used for documentation work in the libraries

Sl. No	Library operations	No. of operations performed by libraries	Percent (%)
1	CDS/ISIS processing	27	54
2	Indexing	30	60
3	Bibliographic searches	26	52
4	Current Awareness Service (CAS)	20	40
5	SDI	10	20
6	dBase and others	14	28
7	CD-ROM searches	13	26
8	Publications	13	26
9	Abstracting	6	12
10	Fax transmission	6	12
11	Translation services	7	16
12	Photocopying services	38	76
13	E.mail	10	20
	Total	229	

Various computers are being used for library and documentation work in Bangladesh. Most of these are forth generation computers. Of late, many libraries

have started developing mini-computer-based system. Most of the systems are operating. Only 3 of them are providing terminal facility to their users for carrying out searches. North South University Library (NSU) has established a Local Area Network (LAN) for the users within the university. Among the libraries surveyed only 3 of them have a direct access into internet: libraries are North south University Library, Community Development Library and DISC, ICDDR,B Library from November 1996.

The CD-ROM technology is quite popular, only a few libraries and information centres have installed the facilities, and offer services from the CD-ROM databases. Result of this survey shows that the CD-ROM facilities and databases in electronic formats are available in 13 libraries and information centres among the respondents, the list of which is given in the *Table-15*. DISC, ICCDR,B and other 7 Asian organizations have been participating in CD-ROM project, called AHEAD (Asian Health, Environmental and Allied Databases) and its products are now available in some of library for use. The organizations have been contributing their databases to produce the Asian CDs. This is the first attempt to produce CDs from Asia. IDRC, Canada, has been providing financial assistance to this 6-year project and North South University is one of the subscribers of AHEAD CD-ROM. There are five commercial enterprises, namely Agni, Drik, Prothesta, Information Services Network, and Grameen Bank have been marketing the E.mail system in country. So far, only 10 libraries and information centres have installed to E.mail facilities, the list which is given in the *Table-15*.

Many libraries and information centres prefer PASCAL language with CDS/ISIS for their operations. This appears to be easy for use and suited for library work. The choice of the language depends on the hardware and programmes available locally and at a cheap price. Most software packages used in the libraries, were imported except the Bangla software. Locally available packages are not suitable for use in

library operations. Many of the libraries using ready-made packages felt that available packages were neither suited to their specific needs nor economical. They are of the opinion that *taylor-made* programmes suited to their needs will be efficient and economic. However, other technologies are also being used for information handling and transmission in a few libraries and information centres in Bangladesh.

Some of the reasons reported by respondents on the application of new technologies in libraries and information centres are identical with those that are required by the nature and purpose of the libraries and information centres, specially of especial libraries themselves. Such are, for example, the characteristic of libraries of Bangladesh in emphasising information and not the book as a unit and provision of a service to readers who require desired, specific and detailed information. In addition, there is the challenge posed by the present information explosion that naturally demands sophisticated as well as specialized operational methods so as to ensure effective and efficient exploitation. The continuous development of new technologies, moreover, has the consequence that it is becoming cheaper and more efficient so that information can be processed, stored, retrieved, and disseminated more effectively. It is also able to facilitate learning and instruction as well as research.

Respondents also expressed a view as well as a wish to meet the requirements of specific research for current, appropriate, and specific information. The need to enhance communication among libraries for effective resource sharing was also mentioned: on line services would not only make possible high standards for inter-library lending and facilitate the centralization of library process, such as acquisition and cataloguing but would also ensure great uniformity throughout the country. In view of this, it is to be mentioned here that Bangladesh Central Public Library is going to implement a plan of centralized acquisition and cataloguing system. They have been creating centralized database to serve a variety of demands of various

people of the country. On the other hand, the BANSDOC has taken a three-year project to implement Bangladesh's first on-line library information network - Bangladesh National Scientific Library and Information Network (or BANSLINK), and is scheduled to be completed by mid-1998.

Thus, new technologies would also reduce duplication of efforts and enhance cooperation among similar libraries, especially in the comprehensive acquisition of relevant and same type of materials. There have been stray instance of cooperation between libraries in resource sharing as well as in the use of systems mostly out of exigency rather than for the purpose of economy and harmony of services. The cooperation among the libraries and information centres is not sufficient. In such cases, respondents noted, that resources exceeding a certain size require the use of new technologies for effectiveness in their exploitation and that storing information in microform, for example, saves space. At the same time, respondents viewed that the financial and economic constraints immensely require the use of new technologies to control duplication of procurement in various libraries.

However, implementation involves execution of the plan to achieve set goals. Another important element implicit in these considerations is the concept of a time scale. If a plan sets out the strategy and stage for achieving a set of desired future outcomes, it should include some indication of the length of time involved at each stage.

The introduction of new technologies into Bangladesh has still often led to disappointment and disillusionment on the part of the countries involved and out side agencies. The systems have fallen into disuse. The information made available is inappropriate. Social changes, political unstable situations and unwelcome side effects have been experienced. Why have these problems developed? The assumption that technologies would be transplanted to other cultures without sufficient understanding of the needs of the users, and lack of forethought regarding the support needs of the

information systems themselves have been basic problems in Bangladesh. Although a major gap in the literature remains concerning what the results have been after introduction of projects, there have been discussions of the problems involved.

Trained professionals are not available because of lower educational standard, lack of facilities in the institutional level, as well as low paid salary. The hardware required by new technologies must have continued maintenance and support staff in order to function properly. The physical environments required by many new technologies, especially, by the computer systems, is often not available. Bangladesh is tropical country with high temperature, humidity or inclusive dust. Electrical problems are common with either blackouts or power surge that can damage both the hardware and software as well as mechanisms of the other new technologies, and makes it different to have a air-conditioned, dust free environment. still there have many areas without electrical power of any kinds.

The software used with computer systems for library works and services yet not developed in the country due to lack of trained and experienced personnel. Thus, the software that is developed does not take into account the specific needs of the situation. It is difficult to adapt software to local needs.

Often there is a poor information infrastructure in the country, which was pointed out by the respondents of the study. Telephone services are often poor or unavailable, and the quality is very poor for data transmission. The country's postal systems are still traditional, slow and very unreliable. Libraries are not well equipped. There is no bibliographic control of information produced inside the country, not even the imported information of any kind. The high cost of the foreign publications means that libraries can not afford to import them by all libraries. Even though imported in a haphazard manner. There is no coordination or control over them. Enough documents

are not available locally. Due to the low status and priority of libraries, highly motivated and well trained as well as vast knowledgeable individuals are not attracted to or not stay with professions. Many of skilled professional people are looking for job out side country either left already for any developed country. Generally, it is true that existing education systems do not promote the use of information or libraries. People are not trained to be aware of the value of information. This means that the demand for information services is very low.

These factors perpetuate the lack of awareness of information as resources and lead to low motivation in Bangladesh using information systems. Systems are, of course, very expensive to implement and maintain. There is the concern that these new technologies create a dependency on the developed countries. There is also a fear that they only serve the intellectual elite of the country. This group may be satisfied with use of foreign language and may be able to afford the cost of document delivery. The gape between the *have* and the *have nots* with in the country may be widened. On the other hand existing library and information systems not meant to serve the many people of the country not yet felt, even by the government.

These scenes are quite reverse in the western world, use of new technologies have often been initiated as a means for making work more effective and efficient to the high costs of labourer. The education of information professionals now includes the use of new technologies as a tools for the effective handling of information to meet the growing demand for information services at right time. According to respondents' opinion in Bangladesh there *are* not sufficient employment opportunities and labour costs are low, It is feared that the use of new technologies will be cause of greater unemployment.

Table-17: New Technology used in libraries and information centres.

Sl No.	Name of Organizations	Type- writers		Computer	CD-ROM	FAX	Telex	E-Mail	Copier	Cyclostyl e	Phon e			Others
		M	E								Dtr	PAB X	OR	
01	Agricultural Information Centre (AIC)	Y	n	Y	Y	n	n	n	y	n	Y	Y		AGRIS, CDS/ISIS, MI CRFICHE
02	Ain-O-Shalish Kendra (ASK)	Y	n	Y	n	n	n	n	Y	n	n	Y		CDS/ISIS
03	Atomic Energy Centre	Y	n	n	n	n	n	n	Y	n	Y	N		
04	Bangladesh Islamic Foundation	Y	n	P	n	n	n	n	Y	Y	Y	N		
05	Bangla Academy	Y	n	n	n	n	n	n	n	n	Y	Y		
06	Bangladesh Agricultural Research Institute Library (BARIL)	Y	n	Y	n	n	n	n	n	n	Y	Y		
07	Bangladesh Computer Council (BCC)	Y	n	Y	n	n	n	n	Y	n	n	N	Y	
08	Bangladesh Academy of Rural Development (BARD)	Y	n	P	n	n	n	n	n	n	Y	n		
09	Bangladesh Agri. University Library (BAUL)	Y	n	Y	Y	n	n	n	Y	Y	Y	Y		AGRIS, CDS/ISIS, DE VINS
10	Bangladesh Agricultural Development Corporation (BADC)	Y	n	n	n	n	n	n	n	n	n	Y		
	Bangladesh Bank	Y	n	Y	n	n	n	n	y	y	Y	Y		
12	Bangladesh Bureau of Information and Educational Statistics (BANBIES)	Y	n	P	n	n	n	n	n	Y	Y	n		
13	Bangladesh Central Public Library (BCPL)	Y	n	Y	n	n	n	n	Y	Y	Y	n		CDS/ISIS, AV
14	Bangladesh Centre for Science and Industries Research (BCSIR)	Y	n	n	n	n	n	n	n	n	n	Y		
15	Bangladesh Chambers of Commerce and Industries (BCCI)	Y	n	Y	n	n	n	Y	n	n	Y	Y		
16	Bangladesh Civil Service Academy	Y	n	P	n	n	n	n	n	n	Y	n		
17	Bangladesh Institute of Rice Research (BIRI)	Y	n	P	n	n	n	n	n	n	N	Y		
18	Bangladesh Institute of Bank Management (BIBM)	Y	n	n	n	n	n	n	n	n	n	n	Y	
19	Bangladesh Institute of Child Health (BICH)	Y	n	n	n	n	n	n	n	n	n	Y		
20	Bangladesh Institute of Development Studies (BIDS)	Y	n	Y	Y	n	n	Y	Y	Y	Y	Y		DEVINS, CDS/ ISIS, MICROFICHE

Y = Existing P = To be installed n = Not existing M = Manual E = Electric

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#	Name of Organisations	Type	writer	Computer	CD-ROM	FAX	Telex	E-mail	Cepler	Cyclortyle	Dir	PABX	O.R	Others
21	Bangladesh Institute of Diabetics, Endocrine and Metabolic Diseases (BIRDEM)	Y	n	Y	Y	n	n	n	Y	n	Y	Y	n	MEDLINE, CDS/ISIS
22	Bangladesh International Institute of Strategic Studies (BIISS)	Y	n	Y	n	n	n	n	Y	n	Y	n	n	
23	Bangladesh Management Development Centre (BMDC)	Y	n	Y	n	n	n	n	Y	n	n	Y	n	
24	Bangladesh Medical College	Y	n	n	n	n	n	n	n	n	n	Y	n	
25	Bangladesh National Nutrition Council (BNNC)	Y	n	P	n	n	n	n	n	n	n	n	Y	
26	Bangladesh National Science and Technology Documentation Centre (BANSDOC)	Y	n	Y	n	Y	Y	Y	Y	n	Y	Y	n	CDS/ISIS
27	Bangladesh Public Administrative Training Centre (BPATC)	Y	n	P	n	n	n	n	Y	Y	Y	Y	n	
28	Bangladesh Rural Advancement Committee (BRAC)	Y	n	Y	Y	Y	n	n	Y	Y	n	Y	n	CDS/ISIS
29	Bangladesh Science Museum	Y	n	n	n	n	n	n	n	n	n	n	Y	
30	Bangladesh Shishu Academy	Y	n	P	n	n	n	n	n	n	Y	n	n	
31	Bangladesh TV Library	Y	n	Y	Y	n	n	n	n	n	n	Y	n	CD
32	Bangladesh University of Engineering and Technology Library (BUETL)	Y	n	Y	Y	n	n	n	Y	n	Y	Y	n	CDS/ISIS
33	British Council (BC)	Y	n	Y	Y	Y	Y	n	Y	Y	Y	Y	n	MICROFICHE, AV
34	Centre for Integrated Rural Development of Asia and Pacific (CIRDAP)	Y	n	Y	n	n	n	n	Y	n	Y	Y	n	CDS/ISIS, DEVINSA
35	Children's Nutrition Unit, SCF(UK)	Y	n	Y	n	n	n	n	Y	n	n	n	Y	CDS/ISIS, AV
36	Chittagong Medical College	Y	n	n	n	n	n	n	n	n	n	Y	n	
37	Chittagong University Library (CUL)	Y	n	Y	n	n	n	n	Y	n	Y	Y	n	CDS/ISIS
38	Civil Aviation	Y	n	P	n	n	n	n	Y	n	Y	n	n	
39	Community Development Library (CDL)	Y	n	Y	Y	n	Y	Y	Y	n	Y	n	n	AV, CDS/ISIS
40	Dhaka College	Y	n	n	n	n	n	n	n	Y	Y	n	n	
41	Dhaka Medical College	Y	n	n	n	n	n	n	n	n	n	Y	n	
42	Dhaka University Library (DUL)	Y	n	Y	n	n	n	n	Y	n	Y	Y	n	MICROFICHE, CDS/ISIS
43	DISC, ICDDR	n	Y	Y	Y	Y	n	Y	Y	Y	Y	Y	n	CDS/ISIS, MEDLINE

Y = Existing P = To be installed n = Not existing M = Manual E = Electric

#	Name of Organizations	Type	writers	Computer	CD-ROM	FAX	Telex	E-Mail	Copier	Cyclotype	Dhr	PABX	O.R	Others
44	External Relations Division Documentation Centre (ERDOC)	Y	n	Y	n	n	n	N	Y	Y	Y	Y	n	CDS/ISIS
45	Family Planning Association of Bangladesh (FPAB)	Y	n	P	n	y	n	N	Y	n	n	Y	n	POPLINE
46	Fisheries Research Institute library	Y	n	Y	n	n	n	n	n	n	Y	Y	n	CDS/ISIS
47	Forest Research Institute- Chittagong	Y	n	Y	n	n	n	n	Y	n	Y	Y	n	
48	Gano Shahajija Sangstha (GSS)	Y	n	Y	n	n	n	n	Y	n	Y	Y	n	CDS/ISIS
49	Geological Survey of Bangladesh	Y	n	Y	n	n	n	n	Y	n	Y	n	n	
50	German Cultural Centre	Y	n	Y	n	y	n	Y	Y	Y	Y	n	n	AV
51	Grameen Bank	Y	n	N	n	n	n	n	n	n	n	n	Y	
52	Independent University Library (IUBL)	Y	n	Y	n	n	n	Y	Y		Y	n	n	CDS/ISIS
53	Institution of Nutrition and Food Science (INFS)	Y	n	N	n	n	n	n	n	Y	n	Y	n	
54	Institute of Business Administration (IBA)	Y	n	P	n	n	n	n	Y	Y	Y	Y	n	
55	Institute of Public Health and Nutrition (IPHN)	Y	n	n	n	n	n	n	n	n	n	n	Y	
56	Institute Post-Graduate Medicine and Research (IPGMR)	Y	n	P	n	n	n	n	Y	n	Y	Y	n	
57	Institute of Post-Graduate Study of Agriculture (IPSA)	Y	n	Y	n	n	n	n	Y	n	Y	n	n	
58	International University of Business, Agri. and Technology Library (IUBATL)	Y	n	Y	n	n	n	n	Y	n	Y	n	n	
59	Islamic Centre for Vocational Training and Research (ICTVTR)	Y	n	Y	n	n	n	n	Y	n	Y	Y	n	AV
60	Jaganath College (University Proposed)	Y	n	n	n	n	n	n	n	n	n	n	Y	
61	Jahangirnagar University Library (JUL)	Y	n	Y	n	n	n	n	Y	n	Y	Y	n	CDS/ISIS
62	Khulna University Library	Y	n	P	n	n	n	n	Y	Y	n	Y	n	
63	National Institute of Local Government	Y	n	Y	n	n	n	n	Y	n	Y	n	n	CDS/ISIS
64	M/O Agriculture	Y	n	P	n	n	n	n	Y	n	n	Y	n	
65	M/O Establishment	Y	n	Y	n	n	n	n	Y	n	n	Y	n	
66	M/O Health & Populations	Y	n	n	n	n	n	n	n	n	Y	Y	n	
67	Meteorological Department	Y	n	n	n	n	n	n	n	n	n	Y	n	
68	MIDAS	Y		Y	n	n	n	n	n	n	Y	n	n	CDS/ISIS
69	National Institute of Local Government	Y	n	Y	n	n	n	n	Y	n	n	Y	n	CDS/ISIS

Y = Existing P = To be installed n = Not existing M = Manual E = Electric

Dhaka University Institutional Repository

#	Name of Organizations	Type-	writers	Computer	CD-ROM	FAX	Telex	E-Mail	Copier	Cyclestyle	Dtr	PABX	O.R	Others
70	National Health Lib & Doc. Centre.	Y	n	Y	Y	n	n	n	n	n	Y	Y	n	MEDLINE, AV
71	National Institute of Population Research and Training (NIPORT)	Y	n	Y	Y	n	n	n	n	n	Y	n	n	
72	National Institute of Preventive and Social Medicine (NIPSOM)	Y	n	n	n	n	n	n	n	n	n	Y	n	
73	National Library and Archives	Y	n	P	n	n	n	n	n	n	Y	n	n	
74	National Museum	Y	n	n	n	n	n	n	Y	Y	Y	n	n	CDS/ISIS
75	North South University Library (NSUL)	Y	n	Y	Y	Y	n	n	Y	n	Y	Y	n	CDS/ISIS
76	Bangladesh Open University	Y	n	Y	n	n	n	n	n	n	n	n	Y	MEDLINE, AV
77	Press Club	Y	n	Y	n	n	n	n	Y	n	Y	n	n	POPLINE, CDS/ISIS
78	Press Institute of Bangladesh (PIB)	Y	n	n	n	n	n	n	n	n	n	Y	n	
79	Proshika	Y	n	n	n	n	n	Y	Y	n	n	Y	n	
80	Radio Bangladesh	Y	n	n	n	n	n	n	Y	n	Y	n	n	
81	Rajshahi Medical College	Y	n	n	n	n	n	n	n	n	n	Y	n	
82	Rajshahi University Library (RUL)	Y	n	P	n	n	n	n	Y	Y		Y	n	
83	Rangpur Medical College	Y	n	n	n	n	n	n	n	n	Y	n	Y	
84	SAARC Agriculture Information Centre (SAIC)	Y	n	Y	n	n	n	n	n	n	Y	Y	n	AGRIS, CDS/ISIS, MICROFICHE
85	Scholastica	Y	n	Y	n	n	n	n	n	n	n	n	Y	
86	Shah Jalal University of Sc. & Tech. Library (SJUSTL)	Y	n	Y	n	n	n	n	Y	Y	Y	Y	n	CDS/ISIS
87	Sir Salimullah Medical College	Y	n	n	n	n	n	n	n	n	n	Y	n	
88	Square Pharmaceuticals	n	n	Y	n	n	n	n	n	n	n	Y	n	CDS/ISIS
89	UNESCO Commission for Bangladesh	Y	Y	n	n	n	n	n	n	n	Y	n	n	
90	UNIC	n	n	Y	n	n	n	n	n	n	Y	Y	n	
91	UNICEF	Y	Y	Y	n	n	n	n	Y	n	Y	Y	n	AV
92	United States Information Service (USIS)	Y	Y	Y	n	n	n	n	Y	n	Y	Y	n	AV
	TOTAL	89	04	50	13	06	04	08	50	19	56	57	11	AV-4, CDS/ISIS-27, MICROFICHE-9, AGRIS-4, MEDLINE-9, DEVISIA-9, POP. LINE-2

Y = Existing P = To be installed n = Not existing M = Manual E = Electric

With all of these negative factors influencing the introduction of new technologies, perhaps the first question that should be asked is-*Why should NT be introduced?* The various types of new technologies are tools, these are not an end in themselves. Bangladesh do have needs for appropriate information. The access to information is important for the process of development. The ability to improve local resources of information, and to have control of these, is an essential step in meeting the basic needs of Bangladesh. If Bangladesh does not work to improve her information systems she will be ~~left~~ even further behind due to the rapid advances taking places in the developed countries.

The findings indicate that there is a very small number, only 50 of the responding libraries of Bangladesh use computers in the operations. Fifty use photocopiers, 10 use E. mail, 6 libraries use Facsimile machines, 56 libraries have a direct telephone, 57 PABX and 11 have an on request telephone facility in their regular operations. A quick look at the type of these libraries, *Table:17* shows that there are 36 special library, 1 public library including 66 branch library, i.e. Bangladesh Central Public Library and 1 community library including their 40 sub-centres in the rural areas, except for the 12 university libraries where there were only 10 of them using computer. The application of the computer including other new technologies in these libraries is still, however, limited and less than optimal, still at the experimental level. Therefore, the libraries' approach to this technology is rather cautious for fear of failure. On the other hand, there are institutions which exert serious efforts to make applications and use of new technologies in their libraries a successful venture evidenced in their industrious preparations of failure plans and they will to successfully execute them.

The problems embedding the use of new technologies in the majority libraries are serious. Suggested solutions do not seem soluble in the foreseeable future. This particularly applies

to the lack of software, other accessories of the computer as well as new technologies and training of personnel. The former suffers at the lack of expertise capable of producing and/or developing software packages adaptable to meet local libraries' needs, while there are no serious plans to overcome the later. Furthermore, it was found that even those libraries which were planning to use the computer in the future, are incapable of executing their plans for the shortage of qualified staff to carryout present and future projects. In addition, these libraries are facing difficulties in receiving such professionals locally.

Insufficient funds, and lack of administrators' understandings, cooperation and support have contributed negatively in providing proper library and information services to users. Administrators' resistance to change can be seen as libraries and information services tend to be low on their list of priorities. In supporting this view Jordanian library specialist Abul Razeq Younis stated that "libraries and information services have not occupied a conspicuous position in official planning, nor has a comprehensive plan for their development been prepared". I myself fully agreed with this statement.

It is revealed that the libraries in Bangladesh are really handicapped by a shortage of funds. As a result, these have shortage of professional trained staff, impoverished collections (qualitative as well as quantitative) and inadequate library premises and equipment and new technologies for developing prompt services as desired by the users. Therefore, libraries become incapable of meeting their users' information needs, thus reducing level of services as users turn away to other information sources. Libraries will then be viewed by officials as less important. It is a vicious loop that libraries of Bangladesh face which will be resulted in reducing libraries' budgets, and therefore the availability of materials. The lack of awareness of the importance of libraries by user groups adds to the dilemma which libraries of Bangladesh encounter.

Nevertheless, especially the use of computers in the libraries and information centres of Bangladesh are limited to traditional functions, a stage long passed by libraries in the west. While we see that these libraries began dealing with electronic form of information, termed *Electronic Publishing* (a generic term for the distribution of information on computer databases linked by communication network. Videotex is an example of these method of publishing) libraries of Bangladesh just began to think how to switch on for their functions with use of computer and other new technologies.

However, should the libraries of Bangladesh become able to overcome all obstacles hindering their use of new technologies, and realise suggested solutions, they will have a rare opportunity to achieve substantial progress in automating their regular functions, and therefore providing better library and information services to their valuable clientele. It is worth mentioning here that the libraries of Bangladesh could benefit from the facilities provided by the telecommunication system in the country. This system would, no doubt, enhance the chances for these libraries especially in the linkage with other national, and international information systems in near future.

However, what is mostly needed now is to lay the foundations for the basic infrastructure for the development of a national information network to permit libraries and information centres access to information network around the world. This is a realized fact dictated by the nature of scientific and technological advancements. However, progressive administration is another important factor needed at such a crucial time to position libraries in their proper place. Furthermore, a campaign to seek bureaucratic support for libraries by all means is also needed.

Other important reasons mentioned by the respondents for the application of new technologies in libraries and information centres included the desire to meet the ever

present need of users for document copying. The respondents were concerned on the effectiveness as well as impacts of new technologies in the services. Respondents are also expected to have the possible benefits of the new technologies. These are: 1. To get a wide variety of information, often from a single source more easily; 2. To send messages more easily; 3. The user can stay at home or in his working place to complete transactions; 4. To browse at any time and can have the information in printing or visual form of interaction; 5. To transmit in any form; and 6. The right information can be obtained at right time in the right place and at the minimum cost for effective use.

Another benefit is that people become more skilful when they can use such system and switch from one to another. Telecommunication networks are here to stay. These will be used by more and more people for all sorts of things, predominantly concerned with information use.

Moreover, reasons to consider new technologies in service because of its effective impact on the services are also great as information is being provided in a different form and by a different medium. Basically, it is the same information, but it is being made available in a quicker, usually more convenient manner, but at greater monetary cost in some cases. The cost does, however, save user's time, energy, and effort.

It was also noted that the application of new technology in the libraries of Bangladesh is fashionable and prestigious, and has consequently improved the perception of the role of the librarian or professionals as the guardian and disseminator of specialized knowledge. Finally, it was observed that new technologies are only means of exploiting certain records that are not available in printed form.

***PROBLEMS OF USE OF NEW
TECHNOLOGIES IN BANGLADESH***

CHAPTER TEN

PROBLEMS OF USE OF NEW TECHNOLOGIES IN BANGLADESH

The library and information sector in Bangladesh has not yet been able to reach the level of development required to effective support to education, research, industrial, and socio-economic development efforts in the country. They have been suffering from many shortcomings, the details as found by the researcher as well as stated by the respondents, are elucidated in the following pages.

In spite of many shortcomings, it is notable that the computerised work started in Bangladesh in 1964 with Bangladesh Atomic Energy Commission (BAEC), Dhaka for research and development purposes. Actually there was no initiative to computerise the library works until 1980s other than telecommunication in Bangladesh. Our position cannot compared with any of the countries in respect of the of use of new technologies in libraries. But many countries of Europe, America, and even some of the Asian countries have made considerable progress in this direction during the last two decades. They have computerised each and every library activity and documentation work and made the services effective with the use of new technologies. The concepts of on-line retrieval and networking have brought revolutionary changes in library and information work.⁽¹⁾

On-line searching of external databases has been available since the early 1960s⁽²⁾ in

1. Kumar, PSG. Computerization of Indian libraries. Delhi: BR Publishing, 1987. p. 301.
2. Rowley, J. The basics of information technology. London.: Clive Bingley, 1988. p.19.

USA, UK, and other places of Europe. In Bangladesh, unfortunately, we are still in the cradle. Since the 1980s, in a period of 15 years, only 50 libraries and information centres have made a beginning in computerisation, 10 have linked with E. Mail, 10 have a Facsimile services. All these institutions have together computerised 428 operations which as shown in the *Table-12* and *Table-13*. However, the need for using new technologies in this field is being felt by the librarians, decision makers, and the user community at large. There are a lot of impediments in the way of application and use of new technologies in the libraries and information centres of Bangladesh. The respondents in the study and myself have found out these problems, as are discussed categorically in the following sections.

-Bangladesh is the 8th largest populated country of the world;⁽³⁾ but one of the major problems is the availability scientifically and technically qualified people and the social and moral responsibility of the Government and the society for its proper utilisation. It is guessed that the application and use of new technologies will result in substantial reduction in the number of personnel already employed or required to be employed in the future. There have been a general feeling in the public and more so in the employees that the use of new technologies will lead to large-scale retrenchment.

-In Bangladesh in some cases administration and management of the library are vested upon such non-professions who has not any professional qualifications, experience or idea. Generally these people are not aware of potential of use of new technologies in the libraries. Their resistance to change and their fear and inability to face a new reality in the form of new technologies are the important psychological problems in implementing new technologies in those libraries.

3. World Bank. Development report: 1996. DC: World Bank, 1995. p.162.

-Application of new technologies has allowed one to create a “dossier society” that invades that evades his/her privacy and threatens civil rights as well as other social and commercial interests.

-At present in Bangladesh almost all the important libraries are trying to use new technologies. But the application and use of new technologies are not considered essential for some types of libraries, such as those where the user is one who wishes only to see the materials as opposed to one desiring bibliographical retrieval. This can also be extended to the type of library in which the clientele is constituted of users who are very independent in their study and hold private collections in Bangladesh. In many cases, the administrators are not fully aware of the importance of uses of new technologies in libraries; administrators' resistance to change in implementing new technologies in libraries is also an important problem.

-It is observed that some libraries of Bangladesh specially the special libraries have started using new technologies since 1980s without creating the essential infrastructure. They did not consider the economic, political and social implications of the use of new technologies. In this way or that way they had some amount of money and they purchased without paying due attention to its use in the library. It is found that in some libraries computers are not being used in any important work. It is being used just as a type machine.

-Many librarians purchased computers for use of the readers but they have never devoted their attention whether the readers are getting opportunity of using the computers in the case of his research or study. In some cases it was found that the readers are not allowed to come by the side of the computer not using it or handling it or operating it for his/her benefits.

-There is also lack of provision of sufficient funds necessary to support the use of new technologies; whatever new technologies are available locally are very expensive;

and the high expenses that the organisation will pay, or will lose when using the new technologies for library work may not be easily provided.

-On the other hand, the lack of provision of sufficient funds in introduction of new technologies in library services was mainly due to the low priority accorded library and information services by policy makers and planners and even by the respective institutional management. The respondents noted further that it was prudent for them to provide traditional manual systems with a stock consisting of the more permanent printed materials than to spend their meagre resources in providing new technologies that is capital-intensive and requires constant maintenance and replacement. For example, some of the minor repairs and replacement which the respondents stated include damaging photocopying or Xeroxing machines, broking the glass of slide projectors, burning electrical parts of the video-tape recorder or servicing of computer, etc. The initial cost of the establishment of some of technologies is beyond the capacity of many libraries.

-There some other problems were identified by the respondents that include: the lack of infrastructure to support it properly. The first problem in this area is the space allocated to the library which is often insufficient or is hosted in improper places; the size of library collections does not justify the use of new technologies; and some libraries are recently established.

-The irregular power supply coupled with the frequent inability of stand by generators in an emergency owing to lack of maintenance is a constraint of NTs in libraries. Most new technologies, according to respondents, are electrically operated which may break down if the power supply cannot be regularly maintained.

-The cost factor is a very significant one for most of the libraries of Bangladesh. A

realistic picture needs to be obtained on costs of introducing computer technology bearing in mind the relatively weak value of the Taka against the US dollar or pound sterling, the currencies in which these products are normally quoted.

Government taxes on hardware, software and supplies are increasing the overall costs considerably. Admittedly, government bodies in Bangladesh have duty free status, but this is generally utilised for hardware rather than for software or supplies such as printer-ribbons, diskettes and paper.

-It is also interesting to note that the use of the computer or word processor for general office routines, such as producing letters and reports, has increased costs. Even omitting the cost of machines (capital costs), the recurrent costs are still significant. Some printer cartridges have relatively short usage compared to that of a ribbon for a typewriter. Further, in addition to paper, diskettes have to be used, and there is, generally speaking, the tendency to use more paper with the computer/word processor; as it is so convenient to correct errors, for example, the "draft" copy for corrections and editing has become the norm.

-The availability of specific software and related hardware is another problem. For example, sufficient funds are not available to purchase suitable software to build the national bibliographic database with national libraries and others. The dilemma for the National Library is that it has a choice either to continue or start to build its database using mini-micro. CDS/ISIS (which it had decided to use rather than do nothing) on an IBM PC knowing that this is a short-term solution, or instead to seize the opportunity to upgrade to a system that can support its planned databases in the long-term at the risk of inadequate hardware support.

-As implied above, another problem is the availability of local support and maintenance for a selected system. Other packages being used in libraries in

Bangladesh are d-Base II/III INMAGIC, mini-micro CDS/ISIS, and customised packages. Regarding d-Base II/III there is no sufficient expertise in Bangladesh to provide full support for any user.

INMAGIC is being used by one library (BARC), which uses only one module. Support for this package is at the moment based in the United States so that any local assistance or training or consultancy involves airfares, per diem expenses and high consultancy fees. Mini-micro CDS/ISIS is used by twenty seven libraries. Although it is supported by UNESCO, there is no guarantee that there will be funds available for its continued development and support. Further, the distance of UNESCO from this region causes unacceptable delays both for correspondence and visits. Customised packages do have local support, but upgrading or enhancement of these are unlikely as the suppliers/designers have developed the software on a one-off basis. Continuing development of a product of such relatively low commercial value is, therefore, not really feasible.

-One factor which has affected the rate of automation of local libraries in particular has been the attitude of the decision-makers in the organisations to which the libraries are attached. Though many libraries including some special NGO libraries, are now enjoying more status and recognition than previously, there still remains a reluctance to spend much on developing a library. In organisations in which automation is being introduced throughout, the library is the last on the list or may be omitted altogether.

This indicates a need to educate planners and decision-makers as to the role that libraries can and should play in the effective development of any organisation in the present "Information Age". It also implies a failing on the part of librarians in libraries fully to integrate the library within the parent organisation and effectively to promote it as an important structural element for the provision of essential information to both managerial and technical staff. Also implied is the lack of

knowledge of some librarians in new information technology which can prevent them from presenting convincing arguments or proposals for automating a library as part of an integrated information system for an organisation. Further education in this area for practising librarians is a problem that needs to be addressed.

-Regarding the standardisation of the record format for facilitating data exchange, there have been some problems with the consistency of fields and tags. Even though the accepted cataloguing standard is AACR2, not all librarians comply with the minimum standard for bibliographic records as prescribed by AACR2. Not all appreciate, either, the significance of consistency in the use of tags.

-Another problem relating to data exchange is that of compatibility of hardware and software used by different organisations. This is probably more of an inconvenience than an absolute impediment as incompatibilities can be overcome through conversion programmes, even though these do, of course, necessitate further expense and delay.

-Many libraries would like to take advantage of the services offered by data bases overseas. In addition to their high costs, mainly for telecommunications, there is the complication of acquiring foreign exchange. An application has to be made to the Bangladesh Bank and, if approval is given, the applicant then has to take it to a commercial schedule bank to purchase the requisite funds. The whole process including mailing time could take longer than the grace time given for the payment of bills.

-Equipment and product replacement or updating are other areas in which libraries of Bangladesh face problems. Local vendors or agents do not carry a full range of replacement parts, especially expensive ones, so there is sometimes a considerable delay in effecting repairs.

Sometimes, also, upgraded equipment and products are not released in Bangladesh for months or even over a year- after their release in the countries of origin.

Developing countries like Bangladesh is, therefore, not able to take immediate advantage of developments in information technology.

-The introduction of new information technology in the Third World countries emphasises two questions which librarians are aware of and often raise but never fully answer: "Can we afford the new technology?" and "Can we afford not to use the new technology?" Careful analysis and studies are required in order to determine the short and long term implications and benefits of computer applications in the information services of Bangladesh as well as other Third World Countries.

-The cost factor inclusive of equipment, telecommunication and local licensing agreements with the monopoly institutions like Bangladesh Telephone and Telegraph Board (T&T) makes the use of telecommunication services a strain on the budget of most libraries. The Bangladesh T&T Board, which has a monopoly, franchise for internal telecommunication, for example, requires that modems, unless internal, must be leased from that company. Annual lease costs are equivalent to the cost of a modem. Costs for a private wire or leased line can run into thousands of dollars annually. In addition there are installation and monthly charges.

-There are some major problems associated with micrographic and reprographic equipment include heavy reliance on the few commercial firms for processing, technical advice and servicing. Their lack of knowledge and appreciation of the special requirements of libraries lead at times to poor quality films inappropriate equipment, poor servicing and frequent malfunction of equipment. }

-Lack of technical knowledge and experience on the part of librarians who are easily influenced by salesmen have also contributed to problems. Microfilming is sometimes

viewed as the solution to space problems without a sufficiently careful examination of alternatives or appreciation of the real costs or benefits, if any.

Until recently the processing of microfilm at the PIB Library was done commercially and therefore the archival quality could not be guaranteed. In addition, only one negative copy was produced and there was no facility for producing positives. The negative therefore served as the use copy as well as the preservation copy- a situation which was most undesirable. Fortunately, duplication facilities are now available and work towards the establishment of a collection of negative masters can be undertaken. Owing to the above situation, therefore, requests for copies of microfilmed material experienced considerable delays in response time as the material had to be re-filmed completely in the absence of duplication facilities.

-The problems which are likely to arise in Bangladesh relates to storage and preservation of this material. It may not be possible to maintain the optimum environmental requirements for the storage and preservation of films. The use of acid-free storage materials for photographs and prints may also be impossible because such materials are usually imported and require scarce foreign exchange which must be assigned to areas of higher national priority, for example, health supplies. Introduction of optical discs may provide a long term answer to some of these problems, but cost may prove a serious inhibiting factor for most libraries of Bangladesh.

Owing to lack of funds, countries accept gifts of equipment which are unsuitable for their specific needs or which can not be serviced locally. There is also a problem relating to the lack of training programmes which could lead to the development of skilled and experienced personnel to work in these areas. Consequently, even when

information technology is introduced, progress is hampered by the shortage of experienced personnel who can provide the required leadership. The technology of automation is not so old in country, and only now, libraries are moving in that direction since 1980s. In true sense automation was started in 1990s in the libraries of Bangladesh. Many of them are still in their infancy of development, i.e. in the phase of organising collections and holdings of the library. Needless to say, not all libraries are well organised and structured. But it is an essential stage prior to use of new technologies for automation. Many of these libraries have only a small number of collections to automate.

-There is no policy and politics of information and new technologies in this framework, since there is little value attached to *information* per se in Bangladesh. For this reason the present political as well as education system does not wish to spend much money with it. It is much more profitable to invest in production of consumable which gives a quick return, as opposed to expenditures in intangibles such as information that yields only a slow long term return, which actually seems to investors of Bangladesh.

-Some responding libraries have indicated that because they have not used any new technologies not even mini-computer earlier (i.e. since they were established), it makes it even more difficult to use now. One large university library indicated that because of this particular reason, extra efforts and intensive training of staff are needed to overcome backwardness to meet the ever increasing size in the library's collections.

-Libraries have a low priority within the organisational system receiving little funding as has been mentioned above. The librarian, as a whole the library professional, is not regarded with high esteem by the state. There is tremendous lack of interest in libraries by authorities which results in little or no effort to develop them. There is a

felt need to rejuvenate this interest. Also, there is lack of interest from the part of the university's higher administrators. The higher authorities should be aware of the value of libraries if there is to be an investment in the application and use of new technologies for automating of services

-Leadership presents another problem, especially the lack of it. The lack of personnel with expertise in the field is also related to this. Furthermore, there is no infrastructure sufficient for the development of automation. The depth of the problem is that libraries do not have enough employees to take care of their traditional functions and users, and there are very few at the professional level.

-One of the burning problems of the application of new technologies in the libraries of Bangladesh mentioned by respondents is the lack of national coordinating centre and an effort of a professional association of new technologies specialists to champion the cause new technologies in the library services nation-wide. They argued that, if the nation's policy-makers and planners were enlightened the importance of library and information services in the development of the nation, the situation would certainly have been different, especially with regard to the place of profession in the nation's scheme of priorities. The situation is exacerbated by the lack of adequate indigenous new technologies specialists - one of the major reasons for the lack of capability to produce or assemble new information technology locally. Spare parts and after sales services (maximum a year free service), particularly of equipment imported from abroad, are, therefore, either not available or are only available at an exorbitant price with a particular agent or dealer, who runs monopoly business.

-Furthermore, there is a lack of background and appropriate technological knowledge on the part of users. Their low level of awareness makes them unable to use even the simplest new technologies on their own. Some respondents indicated, That users

are unable to carryout even minor operation, like-fitting microfilms or microfiche on to a reader-printer, reading numbers on the feature cards of information retrieval systems, adjusting cassette-cartridge tapes wedged inside a player. Apathy on the part of users towards certain types of new technologies inevitably results in low demands for these. Some users, moreover, according to the respondents, complain that reading microforms or CD-ROM strains their sight. They also prefer printed materials since these are , in their view, more convenient to use because they can be carried and used anywhere as they like . On the other hand, most kinds of new technologies are not readily portable and require special equipment as well as arrangement before these can be used.

RECOMMENDATIONS

CHAPTER ELEVEN

RECOMMENDATIONS

According to Hughes,⁽¹⁾ *information has always been essential to political, economic and social intercourse. Information technology today allow us to create, store, manipulate, retrieve and transmit information on a scale never dreamt of before. " Tomorrow's information technology offers more of the same: an exponential growth in cost-effectiveness and capability, with a pace of change that is much faster than that of the industrial revolution which is now drawing to a close. The application of information technology range from the cellular telephone, networking of text and data equipment, design, production and assembling of manufactured goods, and instantaneous global communications, to whether prediction and interpretation of seismic data for exploration. By the year 2000, when fibre optics will carry libraries of information to anyone, anywhere who pushes a button, information technology will be able to create a nearly information transparent world."*⁽²⁾

Realising the immense necessity of information, vice-president of USA, Mr. Al Gore declared recently in his speech entitled *"Basic Principles for Building an Information Society that ... President Clinton and I have challenged our nation's private sector to help connect every school in America to the information superhighway by the end of this decade. And that is why I renew my call for the*

1. Hughes, Grame C. The Information Age. Asian Libraries, March 1991; 1(1):29.

2. *Ibid.*

creation of a Global Digital Library, so all the world's citizens will have quicker and richer access to all the world's information.⁽³⁾ According to view of Al Gore and Hughes's statements 'information age and society are now upon us . The world is already in the information age and created a society of information. The information age and society are the creature of information technology, which in turn, is the marriage of computers and telecommunications, hardware and software, and services and systems.

The national and socio-economic development of a developing country like Bangladesh can not be thought of without the effective use and support of information. Information technology has important implications for rural, industrial, cultural and research development. It is virtually impossible to carryout any activities without the help of libraries and information services. *Information is becoming strategic resources for development*⁽⁴⁾ of a nation. The information services industry, particularly new technology based services and products, is expected to become a significant component of the changing world economy. Therefore, Bangladesh will need a well developed information technology infrastructure in order to utilise effectively information for development objectives and create new services that are new technologies-bound, such as the database services industry in the country to make global village with a network. Unfortunately, this important and vital aspects of infrastructure has been tremendously ignored in the past and did never get a priority attention in the planning process. It is now encouraging to note that the present Government has started to increasingly realise the role of libraries and information support in the various sectors of the country's research, development, education, and planning process. "Moral and financial support has been increasingly extended to develop the libraries and their infrastructural facilities and collections. The sector still needs more support to cope with the need of the time. To

3. Al Gore. *Basic principles of building an information society: Post editorial of Press Release of USIS.* Dhaka: USIS, 1996. P.3.)

4 .Selvarani, Sabaratnam and Meng, Loh Chee. *Trends in electronic information services in Singapore. Asian Libraries*, March 1991; 1(1):41.)

ensure the role of science and technology as well as research and development (R&D) activities relating to socio- economic development of the country, the country's library and information system needs to be revamped and developed to satisfactory level."⁽⁵⁾

Considering that efforts involved in developing the application and use of new technologies for the library and information centre calls for substantial supports in terms of time, equipment, money and expertise, it is suggested that authorities may consider the following solutions for the better environment of the use of of new technologies in Bangladesh:

- There are some general principles, librarians should consider before acquiring new technologies for the library:

- He should be as knowledgeable as possible about technology-be able^{to} read, research, compare and exercise a healthy scepticism.⁽⁶⁾

- Time-lag has the advantage that mistake of pioneers need not be repeated, but, carries disadvantage that a comparable body of local experience has not been recruited to support development. Both factors are relevant to the application of new technologies to library and information services.⁽⁷⁾ So, libraries and information centres should take advantage of both the situations.

- It is very important to consider how the new developments fits into the library's mission. Library budgets will be over run by equipment costs and service charges. A conservative attitude will result in not providing the patron with optimum services.⁽⁸⁾ Hence, a balance has to be struck between costs and services.

5. *Situational Report on National Seminar and S&T Information Infrastructures and Services in Bangladesh: second draft*. Dhaka: BANSDOC, April 1996.p.72.)

6. Gangley, DH and Ganley, GD. To inform or to control? The new communication network. New York: McGraw-Hill, 1981. p.741.

7. McGraw, HW. *Responding to information needs in the 1980s*. *Wilson Library Bulletin*, Nov 1979: 129.

8. *Ibid*.

-*Free or fee* is yet another important question. Should libraries continue the tradition of free service or charge a fee to meet the costs? This governed by the nature of the library as well as the clientele of the libraries. Libraries attached to research institutes, R&D labs or institutions, industries, etc. may have to provide services to their own clientele in terms charging fee, whereas academic and public libraries may also charge a subsidised fee from their clientele.⁽⁹⁾

-Most of the librarians lack the exploitation skill. They have not learned how to use the new technological devices effectively. They should acquire the skill of exploiting new technologies to the best of their advantage for increased productivity.

-‘Attitudinal barriers among librarians regarded as a major impediment to realising the potential of new technologies’, Marian and Drake said *Librarian should realise that active participation is more rewarding than static resistance.*

-A programme should be chalked out for training Library personnel in handling and exploiting new technologies. Job analysis is essential for identifying the nature of jobs to be performed and type of trained personnel needed. On the other hand, required to organise special in service training courses for existing library staff on the use of new technologies in Libraries; due emphasize to be given to organise special advanced training courses for professional librarians on the use of new technologies in libraries and to make them computer specialists with the environment of library and information services; and to provide job opportunities with good salary package with good fringe benefits to attract specialists in library automation.

-There are three options left to libraries with regard to database:

-On-line access to external bases;

9. *Ibid.*

- Developing data bases; and
- Developing small database tailored to the local needs from the large external database. These may be subject oriented, and institute oriented.
- Every institution which has library and information services should have a user education programme. Because the strategy for searching a machine-stored data file is qualitatively and quantitatively different. The inefficient and ineffective searching are always very costly and alarming. There must be provision of users' training to make them quicker and effective searchers.
- The institution should support the users by providing a document delivery service. The user is alerted to many materials during the course of search. The abstracts and other surrogates help to reveal more about the contents of these materials making it easier to select those which are interesting. The institution should make the document of interest available to the user either by providing a reprograph of the document, if available locally, or by procuring the same from an outside agency.
- There is necessity of the development of a representative collection of all important documents of relevance in a. a comprehensive database with a networking system; b. a strong reprographic unit; c. a full-time telex or fax transmission facilities; and d. an inter institution liaison/ cooperation or communication system with other organisations.
- A cooperative effort should need to be developed where a central database could work for developing software exclusively for library automation and information retrieval. In such a system each of the participating libraries can have a minicomputer linked with a central database. Such type of networking systems in the western have proved to be economical and a great success.
- The institution should study the costs; cost-benefits and effectiveness. Only those areas which have proven to be cheaper than manual operation and are cost-beneficial and cost-efficient should be taken up for using of new technologies. Measurement

and evaluation should be considered as a continuous process. Such studies in the initial stages will be helpful in convincing the top management and getting the schemes for using of new technologies approved.

-need to be taken for justifying the improper physical facilities for the library into consideration of the authority. The authorities should provide libraries in suitable locations and with sufficient space to house collections, services and to perform functions properly; and develop libraries' collections (qualitative as well as quantitative) to justify the use of new technologies;

-need to allocate sufficient funds to support the purchasing of new technologies by libraries. It is essential to realise the immense necessity of the effective role in socio-economic development and to recognise the librarians as they are being regarded with high esteem unless which results in little no effort to development of the nation. There is a felt need to rejuvenate the negative interest of the authorities in all respect of the application and use of new technologies. At the same time to convince authorities at the higher level of the importance of the use of new technologies; and to develop a level of awareness at the authoritative level sufficient to encourage them to use the new technologies in libraries;

-need to develop a complete and comprehensive range of software packages for the use in computers in the libraries and information centres in the both case of Bengali and English in general; develop a standardised Bengali thesaurus for the use of computer systems employed in the libraries of Bangladesh; and to make available ready-made software packages for libraries and information centres, provided they are Bengali version;

-the Departments of Library and Information Science at the Dhaka University and Rajshahi University and the Library Training institute of Bangladesh Government

should revise their syllabi and introduce papers on data analysis, programming, and complete course on use of Nt. and information retrieval and dissemination devices;

-faculty members should be trained in these areas. They should have microprocessors for instruction and experimental work in their own lab;

-faculty members should encourage their student at M A L Sc. and MPhil level to write dissertations in the areas of new technologies and their use in information services;

-they should organise intensive courses on application and use of new technologies for the benefits of working librarians and information scientist in a specialised contexts;

-professional associations are essentially needed to come forward to create awareness among he librarians about the potential advantages of the use of new technologies and to make them encouraging to go in go in for automation;

-the primary function of professional bodies is to draw the attention of the state authorities to convince and make them understand the importance of application and use of new technologies;

-the professional bodies should come forward to organise seminar, workshop, etc. to create awareness in general, and provide a forum for the discussion of experiments and views on use of new technologies and share each other's experiences;

-the professional bodies will have to make effective relationship with other professional bodies for creating awareness and to organise special interest groups on use of new technologies. This interest groups will serve as agencies for continued exchange of ideas, experiences and literature;

-the associations will have to take interest in bringing out various kinds of publications on various aspects of new technologies. and automation in general, in

libraries and information services with special emphasis to the work done in Bangladesh;

- the Association should take interest in bringing-out manuals, and preparing standardised Bengali thesaurus for information use in conducting surveys and reports and directories;

- it is very essential that the Government of Bangladesh should come forward to formulate the library legislation and a *National Information Policy* as well as a *New Technology Policy* to foster, promote and sustain, by all appropriate means, the organisation, availability and use of information of all sectors of national activity. On the other hand, Govt. should take steps for mobilising and upgrading the existing library and information systems and services and initiating new programmes relevant to our National needs taking advantages of the advances in new technologies.

Here it is necessary to mention as Hogrebe⁽¹⁰⁾ thought as that an appropriate legal framework should be created before digital technology is introduced for using by the general public. Apart from maintaining the public telecommunication monopolies and the separation between information transmission and information content the following elements will be factor of major importance:

- absence of censorship;*

- guarantee of individual and social privacy;*

- freedom of information legislation concerning information held by public agencies, archives, etc.;*

- national legislation concerning copyright and other proprietary rights favouring, for instance, non-commercial group communication, vis-à-vis transitional information and programme oligopolies;*

10. Hogrebe, Edmund FM. Digital technology: the potential for alternative communication. *Journal of Communication*, Winter 1981: 176.

-regulations on issues such as general availability, reliability, accuracy, completeness and transparency of information;

-special regulations on commercial sponsorship of information services dealing with aspects like undisclosed mixing of objective information and commercial promotion.

Comprehensive analysis of such strategic elements of a policy for digital communication should be carried out at the earliest stage as far as possible. And appropriate institutional measures should be taken, if possible, well in advance of full-scale introduction of digital communication technology. This would significantly increase the prospects of digital information and communication technology serving alternative communication purposes.

-The ministry of Education, Information, Science and Technology, BANSDOC, UGC, etc. should come forward to fund various institutions which are experimenting and using new technologies in their libraries and information centres. They should encourage various institutions that are under them to go in for application and use of Nt. in the libraries.

-The Government of Bangladesh should provide finance to national Library for computerising the Bangladesh National Bibliography (BNB) and other bibliographical publications for quick, easy, comprehensive and efficient services.

-UGC should provide funds to various universities relating Library science education for acquiring microprocessors for instructions and experimental works.

-National Program for preservation of Archival Material and Manuscripts should be prepared. Archival and manuscripts resources of Bangladesh are unique. The need for their preservation cannot be over emphasised. Ink on hand written letters is fading, the paper is becoming brittle in the case of some districts records & other materials in the National Archives. Same is true of manuscript collections in various libraries

including library of Dhaka University. Immediate steps are needed to rectify this situation through using micro filming unit, laminating and other technologies.

- Some libraries do not have adequate card catalogues for their collections. It is advisable to skip the card catalogue stage and go directly to the computer catalogue. There are numerous benefits in doing so.

-Computer Catalogue is more efficient. It culminates the need of multiple sets of cards for each entry and tilling time for these sets of cards. Besides the author, title, subject searches which the card catalogue provides, keyword and call number searches are also possible on the computer catalogue. Copies on floppy diskettes for branch libraries, i.e. in the case of the Central Public Library and its 66 branches, can be easily integrated into a national database.

-National Database and Network. The creation of a national database as recommended in the BANSDOC plan is a must if Bangladesh is to share information locally, nationally and internationally and to keep pace with the developments around the world. The plan must include the database, resources of learned societies and national libraries i.e. the Asiatic Society of Bangladesh, Bangla Academy, National Museum and National Archives, these are unique and important to scholars of the sub-continent.

-A computer specialist may be invited to make ensure that the computer equipment and the programs used are compatible with the Western systems without the necessity of conversion. CDS/ISIS might be the best software since: (a) being used in libraries in Bangladesh, and (b) distributed by UNESCO to developing countries free of cost. But a system analyst's advice in this regard is vital before embarking on this project. This should be followed by intensive training courses for librarians.

-Linkage of the database internationally, with compatible systems, Bangladesh will enable to subscribe the databases, i.e. Research Libraries Information Network (RLIN), which is a database of holdings of over 200 US Research Libraries and various indexes of periodicals in Social science and Humanities, Art and Medicine, etc. And with this linkage the US scholars will have access to research materials in Bangladesh; It will be mutually beneficial. In addition to linkage of databases, availability of electronic mail to librarians will further speed up communication between institutions.

To achieve above things, the following recommendations need active consideration of respective authority for implementation of new technologies in Bangladesh.

These recommendations are primarily based on the exiting situation:

-A draft of the *National Science and Technology Information Policy* (NASTIP) was formulated in 1988 by a National Committee Constituted by the then science and Technology Division, Ministry of Education and was submitted to the government for its review and approval. The draft policy was revised in 1995. The extensively revised final draft has already been submitted to the Government for its approval. The NASTIP, now with the Government, should be approved for implementation without further delay, since the policy can be used as a framework to develop and promote the country's information system, especially the science and technology Information system, by facilitating an effective support to carryout the country's education and R & D activities according to the need of the time. But the policy yet to be approved.

Considering the necessity of the country, there is the need to establish a new concept like *Bangladesh Integrated Library And Information Centre Automation Service* (BALICAS). The BALICAS will act as a focal point to coordinate the system throughout the country and support the libraries and information centres in all

respects. Such bodies have been working in the developed countries like USA, UK, as well as in Singapore. For example, the name of the *Singapore Integrated Library Automation System* (SILAS) is worth to mention here. Twenty One distinct libraries of Singapore have participated under the SILAS working force to maintain a unique networking within the participating libraries through Open Public Access Cataloguing (OPAC) system.

-Considering the developments in the field of information and communication technology and its role in information system development, as well as to cope with and suit to the need of the time and to make it suitable in accordance with the demands of beneficiaries, *BALICAS* should be developed as an efficient and effective information centre for the benefits of the nation and its people. The proposed *BALICAS* should aim at playing its due role as an information services centre than as a resources centre and acting as a national coordination body under the Ministry of Education.

-Development of technical human resources of the library and information centres is being felt urgently. The activities have been greatly suffering due to the shortage of skilled and trained professionals. It is therefore, important to equip each and every organisations with needed manpower to undertake and strengthen the publications acquisition programme, current awareness, abstracting, indexing services with the use of new technologies, information network, and information dissemination activities using new technologies. As required. Existing professional staff should be sent abroad for training and higher education in the areas of automation, networking, indexing and abstracting, organisation of SDI and Current awareness services. They should also be given opportunities to attend International conferences to up-dated their Organization to new developments in the field.

-To make the resource sharing and information network effort a success, it is important to develop appropriate infrastructural facilities, especially dedicated communication linkages, computer facilities, space, etc. at the level of the participating Organizations and institutions.

-To avoid complexities and for smooth functioning of the resource sharing and network system, it is greatly important to develop a handbook detailing the plans, policies, activities to be performed, rules and regulations, working procedures, structure, distribution/demarcation of responsibilities, etc. relating to the network, and a manual detailing the procedures for networking and resource sharing, standards for information handling and management, products, services, etc. for the use of network participants. Aims and objectives of the network, types of services to be offered, and the expected products and services should also be clearly delineated in the handbook, so that no confusions remain in the minds of the network participants while carrying out their assigned activities, tasks, and responsibilities.

-Immediately there is the need to begin to create databases of the country's publications and documents (monographic materials periodicals, periodical articles, document, project reports, feasibility study reports, including non-conventional materials, journal holdings of the different libraries, on going projects), and publications of experts, organizations, and institutions. Without such databases, efficient and effective information services can not be instituted. Preparations and plans should also be made to make these databases available in electronic formats (CD-ROMs for example).

-No libraries in the country currently have any direct access to any regional and international databases. The *BALICAS* may be initiated to start a system to have an access to these databases, thereby increasing its efficiency in providing information and

literature support to the country's scientists of all spheres. Provisions should be made to access the databases on CD-ROM procured by different libraries *on* and *off-line* basis.

-Presently BANSDOC has undertaken a project to automate some 15 S & T libraries in three phases. Under this project, major and resource libraries should be connected through a dedicated telecommunications system to facilitate the exchange of information and sharing of resources until the *BALICAS* should begin its function. That is all major libraries should be linked with fax, e-mail, computer-based communications, and photocopying facilities to facilitate faster transmission of information and documents to meet the needs.

-All major related international databases on CD-ROMs should be made available in Bangladesh to know the availability of information and literature required by the information users, and these databases should be made available online among the network participants through a telecommunications network facility. To materialise this programme, the infrastructural supports and financial assistance (such as much budgeting allocation, priority is to be given for installing telephone connections, etc.) of the government and the T & T Board . required.

-Professional associations should develop their own strategic plans to decide on their roles and responsibilities in the context of the impacts of new information and communications technologies. They need to monitor rigorously the quality of education and training offered in the field, and undertake research initiatives. Opportunities are there to use the expertise and services of the Library Association of Bangladesh. As before, more collaborative projects and programmes may be undertaken by and carried through the Library Association of Bangladesh, the largest professional association in the field in the country.

-The Institute of Library and Information Science, managed by the Library Association of Bangladesh, has already proved its worthy in the field of library

education and training in the country. Considering its potential, the Institute should be strengthened and developed further to undertake and offer more courses to respond to the growing need, particularly in conducting short courses on new technology (use of new technologies, software development,, etc.) and other related as well as specific fields of new technologies using programmes. User education on basic new technologies and their usage, continuing education and the training programmes may be conducted through the BALID, ILIM, Institute of Library and Information Science, which has the ability, expertise, and experiences to carry out such training programmes.

-The library and information science teaching and the training institutions of the country urgently need to evaluate the emerging situation and to assess the new requirements of the profession especially in the context of the developments and applications of various types of new information and communications technologies. This is urgently needed to prepare the country's students and the neo-librarians for new roles and responsibilities, and to cope with the need of the time and the new environment. In addition to the core courses, the following areas need to be given priorities while designing the new course curriculum:

- *techniques and means of information acquisition and dissemination of information utilising new technologies.
- *use of information resources, and socialisation of information use
- *systems analysis, design and development, information systems development, handling of database software and programme writing, and creation of databases
- *management of information systems, and Organization of automated information services
- *standards in organisation and management of information and literature
- *handling of new information and communications technologies, development search strategies, computer-based information networks, electronic publishing-based products

*communication and writing skills, and marketing of information services

*libraries and librarianship in Bangladesh

-Since the use of computers in Bangladesh is very insignificant, it is recommended that *BALICAS* as a coordinating body of information system in the country could take the lead in library automation. Plans and programmes may be chalked out for library automation phase by phase. All relevant authorities may be moved for allocation of funds for new technologies including computer and software. Training of library personnel in *Micro CDS/ISIS* may also be regularly organised for skill development. Emphasis should be given to see that after training the trainees are able to use *Micro CDS/ISIS* software with their Organization. The *Micro CDS/ISIS* software is easy to use, and personnel with standard education shall be capable for this purpose. The training programmes on the use of database software should concentrate on the following areas: a. *Definition of database*; b. *new technologies*; c. *Modify correct and delete records*; d. *Automatic building and maintaining fast access files to each database*; e. *Retrieving records*; f. *Sorting the records*; g. *Displaying records*; and *printing catalogues and indexes*.

-A high-power advisory body should be constituted to advise *BALICAS* on the implementation of the programme and its continued growth. The body should be represented by national policy makers, experts in library and information science, information users, researchers, educationists, the professional bodies like BALID and Library Association of Bangladesh.

The success of any development programme largely depends on the effective planning of the activities and the goals set and delineated in the programmes. It is, therefore, important to set a work plan to proceed with the various components of the planned activities and programmes. In view of this, a 6-year work plan (1996-2002) should be drawn up and approved, taking into consideration the various factors,

including the problems and constraints as assorted in the *Chapter Ten*, to implement the recommendations made in this thesis.

Since the country does not have any library standards which are necessary to achieve the aims and objectives of library and information services, standards are needed to be framed to evaluate the performance of the libraries and library professionals. A National Technical Committee with the representatives from Library professionals, as well as the senior professor of the Department of Library and Information Science of University of Dhaka, Rajshahi should be constituted to set appropriate standards relating to technical aspects of use of new technologies, resources sharing and networking systems.

FUTURE PLAN OF ACTION

There is a need for the effective dissemination of information about various kinds of new technologies to policy makers, planners, institutional management, library staff and user through short courses, seminars, conferences, workshops, and the like. These will equip participants with basic knowledge to play their various roles in the more effective exploitation of new technologies in the library services of Bangladesh.

Can application and use of new technologies become a reality in Bangladesh? But it is more needed? Can more be done to install new technologies? Despite a lack of initiation to use of new technologies in most of the libraries of Bangladesh, a more practical and effective venture in using of new technologies can and should be established in the country, albeit on a scale.

The authorities of different libraries in Bangladesh should, convene a conference to discuss the use of new technologies and their impact in application. These will be much easier for professionals to communicate and build a trusting relationship and system of harmony in the services. Obviously, any successful system would require an exceptionally strong commitment to the project by all who participates.

To evolve a national policy statement on use of new technologies in the libraries of Bangladesh. It is necessary for the government to formulate such a policy and draw up a plan for implementation. The professional associations at various levels should come forward to help in promoting such policy.

To identify the areas (e.g. cataloguing: OPAC, entering into the networking systems, etc.) where the use of new technologies will be cost effective in different types of libraries and in their operational management, it may be suggested is to develop a nation-wide database of Bangladesh on the basis of OPAC concept under the leadership of BALICAS will link all national libraries, university libraries, special libraries, including major international organizations' libraries, through a telecommunication network system in the concepts of resource sharing. Finally, need the use and application of new technologies and communication technology in libraries and information centres to be promoted facilitate the storage and fast retrieval of information and the transmission of data as well as efficient and effective information services.

To develop system analytic charts for different types of library operations such as acquisition, circulation, serial control, etc., and information services systems.

To develop an own software systems for various library operations, in particular development programme packages for operational aspects of library management. Accordingly long and short-term training programmes be organized to conduct courses on word processing, application of computers, FAX, E.mail and other new technologies, information storage media and use of retrieval devices, online-off-line searches of various databases, SDI and Current Awareness Services, micrographics, etc.; so as to be made the information service personnel more efficient and useful members of the information-delivery team, and develop a corps of highly competent

and skilled information service manpower to undertake the automation programme and to make the endeavour effective as well as benefited for the community interest.

To achieve inter-compatibility between various indigenous software and hardware systems.

To compile a uniform handbook of software system presently available for various library operations locally in Bangladesh.

To Pilot testing of software/hardware system in chosen contexts.

To test the results of the pilot studies in the day-to-day routines of libraries and arrange to discuss the findings in an appropriate forum.

To prepare an elaborate instructional manual for the use of Nt. in specific library's operations based on the findings of the studies.

To provide for inter-action exchange of ideas and establish cooperative ventures for technology transfer-software and hardware for effective resource sharing various library systems.

It is advisable to begin with the establishment of a union catalogue of the holdings of participated libraries of the pilot studies phase wise. Later, the participated libraries should be worked under a network system for dissemination of information

To structure the syllabi of the Universities considering the importance of the library and information services as well as important of bibliographical and machine-readable format standard activities under the programme of universal bibliographic control (UBC) with the use of new technologies.

In fine, we should urgently pay immediate attention in the formal training to produce skilled personnel or new information technologists or specialists and technicians who will be able to install, maintain and repair new information systems and equipment acquired by the libraries of Bangladesh. Such staff can be trained in the department of library and information science of the Universities, various colleges where library

Science has been introduced as a subject, in the BALID campus; Institute of Library and Information Management on the campus of NAEM under the Ministry of Education, and even in the Library Training Institute, run by Library Association of Bangladesh. Basic courses in the technical management of information should also be taught. Further the number of skilled personal or new technologists and technicians will be able to install, maintain and repair equipment in this field. Manufacturing plants should also be established to assemble or produce such library package equipment and its parts. A professional association of new information technologist or specialists would then also be inaugurated to champion the cause of new information technology through out the libraries and information services of Bangladesh.

If the existing educational institutes fail to organize and maintain, due to unavoidable circumstances, the standard of new technology education, urgently required for the country to cope with the libraries of out side world, a separate and independent institute with the power of degree awarding and having full fledged staff with higher degrees in New Technologies may be considered for the present and future prospects of the country.

CONCLUSION

CHAPTER TWELVE

CONCLUSION

The problems of exponential growth of literature has gradually been resolved with the help of information technologies. The 1980s were marked by a spectacular growth in the production of information, and this was accompanied by far reaching technological, institutional and economic changes. During the last few years, great success has been achieved in the advent of information storage and transmission technologies. Information communication technology refers to the facilities of storage, retrieval, dissemination and transmission of data, information, and documents in electronic formats, such as computers, microelectronics, video-disc systems, optical storage systems, hypertext and hyper media technology, E.mail, and internet, and other type of telecommunication links. The most significant development in the information storage technology is the computer and CD-ROM systems. What has happened is that information technology today allows us to create, store, manipulate, retrieve, and disseminate and transmit information one never dreamt before.

New technology has made an easy and faster access to the world of information and literature. Information users can now easily search for information and make literature searches, using on online networking system. Despite the severe economic constraints, electronic storage systems and telecommunications networks have been becoming increasingly popular even in the least developed countries. Countries like Bangladesh, have been gradually adopting various types of new technologies to

provide improved services for those who need them. Advantages of the new environment can be taken when several international networking systems have been in the market to provide access to the major international databases.

New Information technology profoundly affects the way we work (*economics*), the way we act and organize ourselves (*social*), and even the way we think (*psychological*). It has a powerful enabling effect. It is these impacts that best describe the use of new technologies. Information power should be regarded as a capital goods. This meant that information has become an economic commodity which should have its place in economic theory. Information is now collected, stored, maintained, applied, bought, and sold at a price. It has come as a factor in production, equal of land, capital, and labour. New Information technology has converted information into a goods. Libraries of Bangladesh should carefully note all these points. They should make plans and programmes to consider information as a a power in order to improve the socio-economic-political and educational scene of Bangladesh.

One of the first things for government is to organize itself internally to take full advantage of new technologies. The actual operations of Government, from inventory control of public property, to financial accounting, education, health care delivery services, business information dissemination to documented data delivery services, various offices, institutions as well as to the library and information centres are ideally suited to automation applications. Above all, however, Government of Bangladesh should seriously understand the implication of use of new technologies for the betterment of the nation.

The use of new technologies in Bangladesh has also been profoundly affecting the information use patterns and behaviors, dramatically changing the mode of library

operations and services, and making major impacts in audio-visual markets, education and training field, research, literature publishing and etc..

Computers, CD-ROMs, E.mail, and desk-top publishing technology have now been satisfactorily used in different offices in Bangladesh. But this study shows that their wide spread use in libraries and information services are indeed not so satisfactory. Although Bangladesh entered into the computer age in 1964, yet over 45 medium or large size computers are currently in use. In addition to these computers, various brands of personal computers are extensively used at different offices, organizations, institutions, and at personal level, but this use is mainly concentrated in the city areas, although training opportunities in personal computer use, particularly word processing exist even at the rural level.

New technologies have an important implications for rural, industrial, educational , research and development (R&D), socio-economic and cultural development of Bangladesh. Sound and pragmatic policies relating to the use of new technologies in libraries and information services are all most lacking at present. This is not to say that the policies should try to control the flow of new technologies. New technology is like water. Its flow and impact can't be stopped. It gently surrounds an individual, and institution, or even a government. What Government advisors and leaders can do, is to understand this process and optimize it for the benefits of the nation as well as the people of Bangladesh.

Finally, it is necessary to mention that the new information and communication technology has been tremendously influencing all spheres of our life in Bangladesh. New technologies and newly developed information systems are also overpowering the concept of offering services through the traditional systems in the libraries and information services. Different types of publications-journals, books, dictionaries, nyclopedias are now available in electronic formats, such as CD-ROMs, and they

are now easy to use and handle and retrieve. Online access to foreign databases and access to online electronic journals are also available for consultation. Search functions can virtually be undertaken by any educated person even without having previous (extensive) experience in using new technologies, such as a computer, CD player or drive, etc. in the library or even in the house. Huge databases are also available with citations abstracts and in some cases, with text files in CD-ROMs, thereby facilitating easy access to universe of knowledge.

Because of the intrinsic benefits of new technologies and the opportunities they offer, the role of information professionals or librarians will gradually concentrate, as foreseen by many experts in the field, on information acquisition, information handling, teaching, searching techniques, and managing information dissemination as well as control of information. The role of information service people is also gradually changing to orient themselves with systems of providing information services to the users, using new technologies. These developments in information-service process ask for new roles and dimension to be played both information-providers and users. It is imperative to understand the implications of the new information technology and its people's or users' new roles and responsibilities, which concern us most. It is, therefore, an appropriate time to realize the implications of new technologies against the concept of traditional information services, existed and offered by our libraries in Bangladesh. The sooner it is understood, the better will be the fate of Bangladesh.

Without a doubt, libraries are changing and these changes are escalating. Librarians who recognize the shifting paradigm are in a position to activate and reinvent the library and reform the organization. New strategies must be developed if libraries are to be reformed to meet the challenges facing them during the rest of this century. In automation and reorganization of services we should stress the need for more

information with respect to how change comes about, who is involved in decision making, how better use can be made of present staff and their skills, and what measures can be used to determine the success of reorganization. Answering these types of questions will enable the librarians to creatively and actively participate in shaping the future of libraries. Technological change is inevitable; the future of libraries is open-ended.

We know that knowledge is power, and thus information is knowledge, which in turn, creates power. The power is governing the today's world. Simultaneously this power is transmitted with the means of new technologies. Thus, this power and its impact on characters of libraries of all types have been well understood in the developed countries. But this understanding or recognition has not been so carefully and clearly understood and materialized in the libraries of Bangladesh due to problems or handicaps stated in the *Chapter Ten*.

At the end it should be stated that enough attempts have been made to collect information concerning new technologies used in Bangladesh. Materials so collected have been well organized, properly analysed and fully digested. As such it is found that the importance of new technologies has been understood no doubt by many librarians, researchers, educationists and intellegencia in the country. Some libraries have already started to use new technologies in their libraries as shown in the *Chapter Eight*. But mere wish is not enough. The conditions for the use of new technologies are not favorable in the country. The problems in the use of new technologies have been thoroughly discussed in the relevant chapter. Whenever there are problems there must be solutions, applicable to Bangladesh. As such this researcher suggested the most important solutions. If these solutions are adopted and pragmatically materialized it can be hoped that library and information services of Bangladesh like other libraries of developed and developing countries will be automated. Let us hope for the best.

Appendixes: A - D

APPENDIX-A

QUESTIONNAIRE
ON
THE PROBLEMS AND PROSPECTS
OF
NEW TECHNOLOGIES IN LIBRARIES AND
INFORMATION SERVICES OF BANGLADESH

(Please complete all questions relevant to your library services and ignore the rest)

For

Partial fulfilment of Ph.D Course

By

MD. ABDUS SATTAR

Supervisor

DR. SERWAR HOSSAIN

Proffessor

DEPARTMENT OF LIBRARY AND INFORMATION SCIENCE, UNIVERSITY OF DHAKA

Mailing Address

Librarian, Children's Nutrition Unit
Save The Children Fund (UK)
GPO Box No. 55, Dhaka-1000, Bangladesh

Name of the organization : _____

Name of respondent : _____

Respondent's designation : _____

SERIAL NO :

01. Type of library ?

☐

1 = National

2 = Academic (college, university, etc.)

3 = Public

4 = Special (NGO, GOVT, Medical, Research, Training, etc.)

02. Methods of processing ?

☐

1 = Manual

2 = Technological

03. If technological, please mention the year of practicing.

If not technological, please put '9999'

--	--	--	--

04. Please specify existing standard ?

☐

1 = Traditional (There is no any system)

2 = Systematic (Followed some existing rules)

3 = Basis of technologies (Available of new technologies)

4 = Others (specify) _____

9 = Not applicable

05. Please mention the year of establishment
of the library

--	--	--	--

LIBRARY STATISTICS**PRESENT SITUATION
RESOURCES**

06. Total number of books ?	<table border="1"><tr><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>						
07. Total number of journals ?	<table border="1"><tr><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>						
08. National (Title)	<table border="1"><tr><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>						
09. International (Title)	<table border="1"><tr><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>						
10. Total number of Bound Journals	<table border="1"><tr><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>						
11. Total number of Slides	<table border="1"><tr><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>						
12. Total number of Newsclippings (subjects)	<table border="1"><tr><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>						
13. Total number of Audio cassettes	<table border="1"><tr><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>						
14. Total number of Video cassettes	<table border="1"><tr><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>						
15. Total number of Microfilms (Rolls)	<table border="1"><tr><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>						
16. Total number of Microfiche	<table border="1"><tr><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>						
17. Total number of Mimeo scripts	<table border="1"><tr><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>						
18. Total number of Reports	<table border="1"><tr><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>						
19. Total number of Monographs	<table border="1"><tr><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>						
20. Others (specify)	<table border="1"><tr><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>						

SERVICES

21. Total number of professional (MA in Library and Information Sc.)	<table border="1"><tr><td></td><td></td><td></td></tr></table>			

- | | | | |
|--|----------------------|----------------------|----------------------|
| 22. Total number of non-professional
(Other than professional) ~' | <input type="text"/> | <input type="text"/> | <input type="text"/> |
| 23. Total number of para-professional
(Diploma and Certificate) | <input type="text"/> | <input type="text"/> | <input type="text"/> |
| 24. Total number of technical
(Mechanical and Electrical) | <input type="text"/> | <input type="text"/> | <input type="text"/> |

TYPE OF SERVICES:

WHAT TYPE OF SERVICES ARE AVAILABLE ?

(Please put which is only applicable)

1 = No

2 = Yes

9 = Not applicable

- | | | | |
|-----------------------------|--------------------------|------------------------|--------------------------|
| 25. Reading Textbooks | ☐ | 26. Reading Journals | ☐ |
| 27. Reading Reference Books | ☐ | 28. Photocopying | ☐ |
| 29. Current Awareness | ☐ | 30. SDI | ☐ |
| 31. Content Announcement | ☐ | 32. Abstracting | ☐ |
| 33. Indexing | ☐ | 34. CD-ROM Searching | ☐ |
| 35. Bibliographic | ☐ | 36. Counselling | ☐ |
| 37. On-line Searching | ☐ | 38. Retrospective | ☐ |
| 39. Reference Searching | ☐ | 40. Others (specify) : | ☐ |

EXISTING SYSTEM OF DOCUMENT DELIVERY ?

- | | | | |
|--------------------------|--------------------------|-----------------------|--------------------------|
| 41. Postal communication | ☐ | 42. Air mail services | ☐ |
| 43. Facsimile (Fax) | ☐ | 44. On-line systems | ☐ |

- | | | | |
|--|--------------------------|---------------|--------------------------|
| 45. Electronic Mail | ☐ | 46. Cable TV | ☐ |
| 47. Telecommunication | ☐ | 48. Messenger | ☐ |
| 49. Others Specify : | ☐ | | |
| 50. Existing system of services ? | | | ☐ |
| 1 = Traditional | | | |
| 2 = Technological | | | |
| 3 = Others (Specify) | | | |
| 51. Existing system of circulation ? | | | ☐ |
| 1 = Manual | | | |
| 2 = Technological | | | |
| 3 = Others (Specify) | | | |
| 52. Existing system of searching ? | | | ☐ |
| 1 = Manual | | | |
| 2 = Technological | | | |
| 3 = Others (Specify) | | | |
| 53. If technological, please mention the system. | | | ☐ |
| 1 = On-line | | | |
| 2 = Off-line (CD-ROM) | | | |
| 9 = Not Applicable | | | |

WHAT TYPE OF TECHNOLOGIES ARE USED FOR SERVICES ?

(Where applicable please mention the year of installation also)
 (Answering the question no. 54 to 100, please follow the same answer code mentioned under 'Type of Services' on page No. 5)

- * = Which applicable , Year = Please put only last two number
- 1 = No
- 2 = Yes
- 9 = Not Applicable

	*	Year		*	Year
54. Computer	☐	☐ ☐	55. Facsimile	☐	☐ ☐
56. Telex	☐	☐ ☐	57. Telephone	☐	☐ ☐
58. Photocopier	☐	☐ ☐	59. Cable	☐	☐ ☐
60. Video Text	☐	☐ ☐	61. Microfilm- ing unit	☐	☐ ☐
62. Duplica- ting machine	☐	☐ ☐	63. Electronic Mail	☐	☐ ☐
64. Teletex	☐	☐ ☐	65. Television	☐	☐ ☐
66. Others (specify):	☐	☐ ☐			
(Specify) : _____					

WHAT TYPE OF SERVICES ARE EXPECTED BY THE READERS?

67. Borrowing Books	☐	68. Through Telephone	☐
69. Reference	☐	70. Through E.Mail	☐
71. Microfilm Searching	☐	72. Borrowing journals	☐
73. Through Photocopying	☐	74. Microfiche searching	☐
75. On-line Searching	☐	76. Through On-line Network	☐
77. Through letters	☐	78. Through Fax	☐
79. On television	☐	80. Through Telex	☐
81. CD-ROM search	☐	82. Others	☐

WHO ARE THE USERS/BENEFICIARIES ?

83. General public	☐	84. Teachers	☐
--------------------	--------------------------	--------------	--------------------------

- | | | | |
|----------------|--------------------------|-----------------------|--------------------------|
| 85. Students | ☐ | 86. Technicians | ☐ |
| 87. Engineers | ☐ | 88. Scientists | ☐ |
| 89. Physicians | ☐ | 90. Paramedics | ☐ |
| 91. Nurses | ☐ | 92. Researchers | ☐ |
| 93. Librarians | ☐ | 94. Others (specify): | ☐ |

WHAT PACKAGES ARE USED FOR GIVING SERVICES ?

- | | | | |
|---------------------|--------------------------|---------------------|--------------------------|
| 95. dBASE III or IV | ☐ | 96. CDS/ISIS | ☐ |
| 97. Wordstar | ☐ | 98. Word perfect | ☐ |
| 99. CD-Rom | ☐ | 100. Others specify | ☐ |

101. Please mention approximate number of users for the year 1990 to 1994.

1990	1991	1992	1993	1994

102. Total Budget for library/Information center ?

Head of budget	1990	1991	1992	1993	1994
Total budget for library					
Book					
Journal					
New Technologies					
Staff					
Others					

IS THERE ANY PROVISION FOR PROCURING THE FOLLOWINGS IN THE CURRENT YEAR BUDGET ?

(Answering the question no. 103 to 178, please follow the same answer code mentioned under type of services on page No. 5)

1 = No

2 = Yes

9 = Not applicable

- | | | | |
|--------------------------|--------------------------|----------------------------|--------------------------|
| 103. Duplicating machine | ☐ | 104. Computer | ☐ |
| 105. Typewriter (Manual) | ☐ | 106. Electronic Mail | ☐ |
| 107. Leaser writer | ☐ | 108. Electronic Typewriter | ☐ |
| 109. Television | ☐ | 110. Online system | ☐ |
| 111. Veditex | ☐ | 112. Photocopier | ☐ |
| 113. CD-ROM | ☐ | 114. Teletex | ☐ |
| 115. Microfiche | ☐ | 116. Telephone | ☐ |
| 117. Microfiche | ☐ | 118. Microfilm | ☐ |
| 119. Facsimile (Fax) | ☐ | 120. Others (specify) | ☐ |

Do you agree that library should be mechanized with the facilities of New Technologies ?

- | | | | |
|---------------------------------------|--------------------------|---|--------------------------|
| 121. For sophistication | ☐ | 122. Better services | ☐ |
| 123. Smooth services | ☐ | 124. For making more effective services | ☐ |
| 125. Less time consuming | ☐ | 126. Less errors | ☐ |
| 127. For shortage of sufficient space | ☐ | 128. More accurate | ☐ |

- | | | | |
|--|--------------------------|--------------------------------------|--------------------------|
| 129. For attracting readers | ☐ | 130. For shortage of staff | ☐ |
| 131. Others specify | ☐ | | |
| 132. Is there any impact of New Technologies ? | | | |
| 133. Cost effective | ☐ | 134. Efficient | ☐ |
| 135. Accurate | ☐ | 136. Increases standard of services | ☐ |
| 137. More effective to literature search | ☐ | 138. Broadened the scope of services | ☐ |
| 139. Makes a user efficient | ☐ | 140. Makes a staff efficient | ☐ |
| 141. Others (specify): _____ | | | ☐ |

WHAT ARE THE PROBLEMS WITH NEW TECHNOLOGIES AND SERVICES ?

- | | | | |
|--|--------------------------|--|--------------------------|
| 142. Cost increases | ☐ | 143. Unemployment | ☐ |
| 144. Technical errors | ☐ | 145. Makes a staff idle | ☐ |
| 146. Lacking of computer language literate staff | ☐ | 147. Lacking of computer language literate users | ☐ |
| 148. Time consuming | ☐ | 149. Laborious | ☐ |
| 150. Technical barrier to access | ☐ | 151. Operating barrier to access | ☐ |
| 152. Literacy barrier to access | ☐ | 153. Budgetary problems | ☐ |
| 154. Lacking of skilled personnel | ☐ | 155. Environmental problems | ☐ |
| 156. Others (specify): _____ | | | |

157. Did you link up with any On-line Networking System?

- | | | | |
|--------------|--------------------------|-----------------------|--------------------------|
| 158. HELLIS | ☐ | 159. DEVINSA | ☐ |
| 160. POPLINE | ☐ | 161. MEDLINE | ☐ |
| 162. AGRIS | ☐ | 163. Others (Specify) | ☐ |

164. If no, do you interested to link with Network Systems?

- | | |
|--|--------------------------|
| 165. If yes, Why ? | ☐ |
| 166. To meet research queries | ☐ |
| 167. To make faster communication | ☐ |
| 168. To make aware with update information through the systems | ☐ |
| 169. To share with each other within the linked organizations | ☐ |
| 170. To access into more literature with minimum costs | ☐ |
| 171. To meet the necessity with minimum investment | ☐ |
| 172. To install global link with relevant organizations | ☐ |
| 173. To acquire update information as when necessary | ☐ |
| 174. To control duplication of information | ☐ |
| 175. To save money | ☐ |
| 176. To avoid unnecessary delayed of postal communication | ☐ |
| 177. Others (specify): | ☐ |

178. Is there any inter library loan and document delivery systems available with you ? ☐

1 = No

2 = Yes

3 = Not applicable

179. If yes, with whom the systems are existing (please mention here the name of libraries of organizations you are maintaining the systems) ?

Answer :

180. If no, do you feel inter library loan and document delivery system is to be existed ?

1 = No

2 = Yes

9 = Not applicable

☐

181. If yes, Why ?

Answer :

182. If the use of New Technology has changed the way your department is organized, e.g. working practices, staff structure, please state the changes in a few words:

Answer:

183. If the use of New Technology has significantly changed the range or style of your services, please describe briefly:

Answer:

184. ANYTHING ELSE ?

If there are any others developments which you wish to report, but are not covered else where, please describe below:

Answer:

Signature of Respondent

Date:

Appendix-B

List of Libraries Taken as Sample for the Study

Sl #	Name of Organizations	Status	Address
1	AMA International University Library(AIUBL)	University Library	9 Mohakhali C/A, Dhaka
2	Bangladesh Agri. University Library (BAUL)	do	Mymensingh
3	Bangladesh Open University Library	do	K.B. Board Bazar, Gazipur
4	Bangladesh University of Engineering and Technology Library (BUETL)	do	Palssey, Dhaka-1205
5	Chittagong University Library (CUL)	do	Chittagong
6	Darul Islam University Library	do	H# 21, R#9A, Dhanmondi R/A, Dhaka 1209
7	Dhaka University Library (DUL)	do	Ramna, Dhaka-1000
8	Independent University, Bangladesh Library (IUBL)	do	H # 3, R# 10, Baridhara, Gulshan, Dhaka 1212
9	International University of Business, Agri. and Technology Library (IUBATL)	do	H#135, R#9A, Dhanmondi R/A, Dhaka 1209
10	Islamic University Library	do	Kushtia
11	Jahangirnagar University Library (JUL)	do	Savar, Dhaka
12	Khulna University Library	do	Gallamari, Khulna
13	National University Library	do	K.B. Board Bazar, Gazipur
14	North South University Library (NSUL)	do	12 Kemal Atatürk Avenue, Banani, Dhaka 1213
15	Rajshahi University Library (RUL)	do	Rajshahi
16	Shah Jalal University of Science & Technology Library (SJUSTL)	do	Sylhet Sadar, Sylhet
17	University of Science and Technology Library, Chittagong	do	Chittagong
18	Adamjee Cantonment College Library	College Library	Dhaka Cantonment, Dhaka
19	Ananda Mohan College Library	do	Mymensingh
20	Badrunnessa Govt. College Library	do	Bakwshi Bazar, Dhaka-1000
21	Bangladesh Medical College Library	do	Road #14A, Dr/A, Dhaka-1209
22	Chittagong Medical College Library	do	Chittagong

23	City College, Dhaka Library	College Library	Road # 2, Dhanmondi R/A, Dhaka -1205
24	Devendra College Library	do	Manikgonj
25	Dhaka Medical College Library	do	Dhaka-1000
26	Eden girls College, Dhaka Library	do	Azimpur, Dhaka -1205
27	Home Economics College Library	do	Nilkhet, Dhaka-1205
28	Jaganath College University Library	do	Sadar Ghat, Dhaka-1202
29	Kabi Nazrul Govt. College Library, Dhaka	do	Sadar Ghat, Dhaka-1202
30	Khulna Medical College Library	do	Khulna
31	Murari Chand Govt. College Library	do	Sylhet
32	Mymensingh Medical College Library	do	Mymensingh
33	Rajshahi Medical College Library	do	Rajshahi
34	Rangpur Medical College Library	do	Rangpur
35	Shahid Shohrawardi Government College Library	do	Laksmi Bazar, Dhaka -1202
36	Sir Salimullah Medical College Library	do	Mitford, Dhaka-1203
37	Titumir Government College Library	do	Mohakhali, Dhaka-1212
38	Bangladesh National Scientific Technical Documentation Centre (BANSDOC)	National Library	1, Mirpur Road, Dhaka 1205
39	National Health Library & Documention Centre (NHLDC)	do	Mohakhali, Dhaka-1212
40	National Library and Archives (NL&A)	do	Agargoan, Sher-e-Bangla Nagar, Dhaka -1207
41	Academy of Planning and Development Library	Special Library	Babupara, Nilkhet, Dhaka -1205
42	Agricultural Information Centre (AIC)	do	BARC, Farm Gate, Dhaka-1215
43	Ain-O-Shalish Kendra Library (ASK)	do	26/3, Puran Paltan Lane, Dhaka 1000
44	Asiatic Society Library	do	Nimtali, Chankhar Pool, Dhaka-1000
45	Atomic Energy Commission Library	do	Ramna, Dhaka-1000
46	Bangla Academy Library	do	Ramna, Dhaka -1000
47	Bangladesh Academy of Rural Development Library (BARD)	do	1 Elephant Road, Dhaka-1217
48	Bangladesh Agricultural Research Institute Library (BARIL)	do	Kotbari, Comilla
49	Bangladesh Bank Library	do	Joydevpur, Gazipur
50	Bangladesh Chambers of Commerce and Industries Library (BCCIL)	do	Motijheel C/A, Dhaka -1000
51	Bangladesh Civil Service Academy (Admn) Library	do	Chambers Building, Motijheel C/A, Dhaka 1000
52	Bangladesh Civil Service Training Institute Library	do	Habibullah Road, Shahbagh, Dhaka-1000
53	Bangladesh College of Physicians and Surgions Library (BCPSL)	do	Eskaton, Magh Bazar, Dhaka-1217
54	Bangladesh Computer Council Library (BCC)	do	R # 7A, Dhanmondi R/A, Dhaka-1209

55	Bangladesh Institute of Bank Management Library (BIBM)	Special Library	Mohakhali, Dhaka -1212
56	Bangladesh Institute of Child Health Library	do	Mirpur, Dhaka
57	Bangladesh Institute of Development Studies Library (BIDSL)	do	Sher-e-Bangla Nagar, Dhaka -1207
58	Bangladesh Institute of Diabetics, Endocrine and Metabolic Diseases Library (BIRDEML)	do	Shahbagh, Dhaka-1000
59	Bangladesh Institute of Rice Research Library	do	Joydevpur, Gazipur
60	Bangladesh Insurance Academy Library	do	Mohakhali, Dhaka-1212
61	Bangladesh International Institute of Strategic Studies Library (BISSL)	do	1 Elephant Road, Dhaka -1217
62	Bangladesh Islamic Foundation Library	do	Baitul Makkaram, Dhaka
63	Bangladesh Jute Research Institute Library	do	Joydevpur, Gazipur
64	Bangladesh Management Development Centre Library (BMDCL)	do	Sobhanbagh, Dhaka 1209
65	Bangladesh National Nutrition Council Library	do	Mohakhali, Dhaka-1212
66	Bangladesh Personal Management Institute Library	do	Asad Gate, Dhaka-1209
67	Bangladesh Public Administrative Training centre Library (BPATC)	do	Savar, Dhaka
68	Bangladesh Roads and Highway Library	do	Park Avenue, Ramna, Dhaka-1000
69	Bangladesh Rural Development Board Library (BRDB)	do	Kawran Bazar, Dhaka -1208
70	Bangladesh Shishu Academy library	do	Ramna, Dhaka- 1000
71	Bangladesh Telephone and Telegraph Board Library	do	Elephant Road, Dhaka 1217
72	Bangladesh university Grants Commission Library	do	Sher-e-Bangla Nagar, Dhaka -1207
73	British Council	do	5, Fuller Road, Dhaka-1000
74	Care International Bangladesh Library	do	House # 66, Road # 7A, Dhanmondi R/A, Dhaka
75	Caritas Development Institute Library (CDIL)	do	2 Outer Circular Road, Dhaka-1217
76	centre for Integrated Rural Development of Asia and Pacific Library (CIRDAPL)	do	Cameli House, Segun Bagicha, Dhaka-1000
77	Children's Nutrition Unit Library, SCF(UK)	do	2 Bara Magh Bazar, Dhaka
78	Civil Aviation Library	do	Zia International Airport, Uttara, Dhaka
79	Directorate of Primary Education Library	do	Mirpur, Dhaka
80	External Relations Division Documentation Centre (ERDOC)	do	Sher-e-Bangla Nagar, Dhaka- 1207
81	Family Planning Association of Bangladesh Library & Doc. Centre	do	2, Purana Paltan, Dhaka-1000
82	Fisheries Research Institute Library (FRIL)	do	Mymensingh

83	Forest Research Institute Library (FRIL)	Special Library	Chittagong
84	Gano Shahajjya Sangstha Library (GSSL)	do	41, Sir Syed Road, Block A Mohammadpur, Dhaka 1207
85	Geological Survey of Bangladesh Library	do	Segunbagicha, Kakrail, Dhaka -1217
86	German Cultural Centre	do	Road # 8, D R/A, Dhaka -1205
87	Grameen Bank Library	do	grameen Bank Bhavan, Mirpur-2, Dhaka -1216
88	Institute of Chartered Accountant Library	do	CA Bhavan, Kawran Bazar, Dhaka 1208
89	Institute of child and Mother Health Library (ICMH)	do	Segun Bagicha, Kakrail, Dhaka -1217
90	Institute of Cost Management and Accountancy Library (ICMAL)	do	Babupara, Nilkhet, Dhaka 1205
91	Institute of Education and Research Library (IERL), DU	do	University of Dhaka, Dhaka -1000
92	Institute of Nutrition and Food Science Library	do	University of Dhaka, New Market, dhaka 1205
93	Institute of Nutrition and Food Science Library (INFS)	do	University of Dhaka, Dhaka -1000
94	Institute of Post-Graduate Medicine and Research Library (IPGMRL)	do	Shahbagh, Dhaka 1000
95	Institute of post-Graduate Study of study of Agriculture Library (IPSAL)	do	Salna, Gazipur
96	Institute of Public Health and Nutrition Library (IPHN)	do	Mohakhali, Dhaka 1212
97	International Institute of Environmental Studies and Disaster management	do	House # 20, Road # 6, Dhanmondi R/A, Dhaka
98	Islamic Centre for Vocational Training and Research Library	do	Kb Road Bazar, Gazipur
99	Meteorological Department Library	do	Agargoan, Sher-e-Bangla Nagar, Dhaka-1207
100	Micro Industries Development Assistance Society Library	do	House # 5, Road # 16, Dhanmondi R/A, Dhaka
101	Ministry of Agriculture Library	do	Building No. 4, Bangladesh Secretariat, Dhaka 1000
102	Ministry of Foreign Affairs Library	do	Segun Bagicha, Kakrail, Dhaka-1217
103	Ministry of Health & Population Library	do	Building No. 3, Bangladesh Secretariat, Dhaka 1000
104	Ministry of Planning Library	do	Sher-e-Bangla Nagar, Dhaka-1207
105	National Administration of Education and Management	do	Mirpur Road, Dhaka-1205
106	National institute of Local Government Library (NILGL)	do	Agargoan, Sher-e-Bangla Nagar, Dhaka 1207

107	National Institute of Preventive and Socila Medicine Library	Special Library	Mohakhali, Dhaka-1212
108	National Museum Library	do	Shahbagh, Dhaka-1000
109	National Science Museum Library	do	Agargaoan, Sher-e-Bangla Nagar, Dhaka-1207
110	Petrobanga Library	do	Kawran Bazar, Dhaka-1208
111	Press Institute of Bangladesh	do	3,Circuit House Road, Dhaka-1217
112	Proshika Manobik Unnayan Kendra Library	do	I/I-GA, Section-2, Mirpur-2, Dhaka-1216
113	Rural Development Academy Library	do	RDA, Bogra-5842
114	SAARC Argiculture Information Centre (SAIC)	do	Farm Gate, Old Airport Road, Dhaka 1208
115	Social Science Research Centre Library (SSRCL)	do	sher-e-Bangla nagar, Dhaka-1207
116	Tea Research Institute Library (TRIL)	do	Srimangal, Sylhet
117	UNESCO Commission for Bangladesh Library	do	Palessy, Nilkhet, Dhaka
118	UNICEF Library	do	House # 75, Road # 5A, Dhanmondi R/A, Dhaka
119	United Nations Information Centre (UNIC)	do	Road # 11A, Dhanmondi R/A, Dhaka-1209
120	United States Information Service (USIS)	do	Jiban Bima Bhavan, Motijheel C/A, Dhaka 1000
121	Dhaka Collegiate School	School Library	Sadar Ghat, Dhaka-1202
122	Government Laboratory School	do	Mirpur Road, Dhaka 1205
123	Green Hearld School	do	Asad Gate, Sher-e-Bangla nagar, Dhaka 1207
124	Oxford International School	do	Road # 16, D R/A, Dhaka-1209
125	Scholastica School	do	Gulshan 2, Dhaka-1213
126	Shiddiswari Girls School	do	Baily Road, Shanti Nagar, Dhaka-1217
127	Sunbeams	do	Road # 16, Dhanmondi R/A, Dhaka-1209
128	Udayon School	do	Fuller Road, Universtiy of Dhaka -1000
129	Uttara Model School	do	Uttara, Dhaka
130	Vikharun-rnessa School.	do	Shiddiswari, Dhak-1217
131	Bangladesh Central Public Library (BCPL)	Public Library	Shahbagh, Dhaka 1000
132	Community Development Library (CDL)	Comminity Library	House # 39, Road # 14A, Dhanmodi R/A, Dhaka 1209

APPENDIX -C

REFERENCE AND BIBILOGRAPHY

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