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DOCUMENTATION AND INFORMATION ACTIVITIES IN BANGLADESH



*A Thesis Submitted to the Banaras Hindu University
for the award of the Degree of*
DOCTOR OF PHILOSOPHY
IN
LIBRARY & INFORMATION SCIENCE

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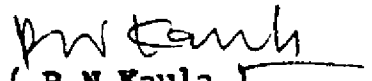
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C E R T I F I C A T E

This is to certify that the present work entitled "DOCUMENTATION & INFORMATION ACTIVITIES IN BANGLADESH" has been carried out by Mr Md Serajul Islam under my supervision and guidance. He has conducted his studies very sincerely, meticulously and methodically. I am fully satisfied with the work of Mr Islam which is being presented by him as a thesis for the Degree of Doctor of Philosophy of the Banaras Hindu University.

It is further certified that Mr Serajul Islam has completed the full prescribed period under Clause 3.1 of the Ph D Ordinances and that the thesis embodies the result of his investigation conducted during the period he worked as a Ph D research scholar.

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P R E F A C E

Information is a vital component of all developmental activities of a nation. Scientific and technical information is the basic input for all decision making activities in transforming the blueprint of socio-economic development into action. Thus organization of information system, particularly planning an infrastructure for national information systems, should get top priority in the national development plans. The present work entitled " Documentation and Information Activities in Bangladesh" is intended to support the country's socio-economic development.

The concept of information and particularly of systematic organized technological information has not yet made its entry in Bangladesh as a major objective and it still plays a minor role in the general flow of communication. It is also realized that in the present day world no nation can prosper without getting high grade information networks/systems.

Bangladesh is a newly emerging nation which came into existence as sovereign and independent state on 16 December 1971. It is a developing country and has to take big strides in achieving its goal as a progressive

nation among the countries of the world. As already stated, the accelerated progress in any walk of life in this country depends on the organized network of information system and services. No attempt has so far been made to achieve this objective. It is for the first time that this study has been taken up to survey, evaluate and project an organized network of information activities in the country.

This study has been made by investigating a number of documents available in Dhaka, the Capital of Bangladesh and other places. Several documents both Governmental and non-Governmental, relating to policy matters and planning in various fields have been studied to survey the present economic, industrial, educational, agricultural and scientific structure of the country. This has further been examined based on the data available in the country. To project an organized structure of information system in Bangladesh, investigation has already been made of the trend of information systems and activities in the three developed countries viz ; UK, USA, USSR and also of progressive developing country like India. On the basis of these studies a pattern for Bangladesh has been suggested which forms the last part of this study.

It is my hope that this research work will be of immense value to librarians, information specialists, planners and administrators of Bangladesh.

It was my good fortune and a privilege to work under the world renowned Library and Information Scientist Professor P N Kaula, Ex-Head Department of Library & Information Science and Former Dean, Faculty of Arts, Banaras Hindu University, whose keen interest, valuable comments, penetrating suggestions, talented guidance and continuous encouragement have led the present investigation to its final shape. I am deeply indebted to him.

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GLOSSARY OF ACRONYMS

AGRIS	-	International Information System for the Agricultural Sciences and Technology.
AIBA	-	Agricultural Information Bank for Asia.
BAEC	-	Bangladesh Atomic Energy Commission.
BANDOC → BANSDOC	-	Bangladesh National Scientific and Documentation Centre.
BARC	-	Bangladesh Agricultural Research Council.
BDSI	-	Bangladesh Standards Institution.
BIDS	-	Bangladesh Institute of Development Studies.
BINT	-	(Buro Inostrannoi Nankii Tekhniki) Bureau of Foreign Science and Technology
CARIS	-	Current Agricultural Research Information System.
CESTI	-	Clearing for Federal Scientific and Technical Information.
CLASS	-	Current Literature Alerting Search Services.

COMPENDEX	-	Computerized Engineering Index.(USA)
COSATI	-	Committee on Scientific and Technical Information.
CPSU	-	Communist Party of the Soviet Union.
CRRERIS	-	Commonwealth Regional Renewable Energy Resources Information System.
CSIRO	-	Commonwealth Scientific and Industrial Research Organization.
CSIRONET	-	Commonwealth Scientific & Industrial Research Organization Network.
D D C	-	Defence Documentation Centre.
DEVSIIS	-	Development of Science Information Systems.
DIA	-	Defence Intelligence Agency.
DRTC	-	Documentation Research & Training Centre (Bangalore, India).
D S A	-	Defence Supply Agency.
EDUCOM	-	Inter University Communication Council (USA).
EDUNET	-	Education Network

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ESRIN	-	European Space Research Institute.
ESRO	-	European Space Research Organization.
EUDISED	-	European Documentation and Information System for Education.
FCST	-	Federal Council for Science and Technology.
F I D	-	Federation International de-Documentation.
IBRD	-	International Bank for Reconstruction and Development.
ICSU	-	International Council of Scientific Union.
I E C	-	International Economic Commission.
I E S	-	International Exchange Service(USA).
INIS	-	International Nuclear Information System.
INPADOC	-	International Patent Documentation Centre.
INSDOC	-	Indian National Scientific Documentation Centre.
INSPEC	-	Information Services in Physics, Electrotechnology, Computer and Control (U K).

ISAD	-	Information Science and Automation Division.
I S O	-	International Standards Organization.
ISTIM	-	Interchange of Scientific and Technical Information in Machine Language.
JICST	-	Japan Information Centre for Science and Technology.
KWIC	-	Key-Word-in-Context.
KWOC	-	Key-word-out of- context.
LIBRIS	-	National Library Information System (Sweden).
MEDLARS	-	Medical Literature Analysis & Retrieval System.
MEDLINE	-	Medlars On-line.
NALDOC	-	National Agricultural Library and Documentation Centre.
NATIS	-	National Information System.
NCST	-	National Council on Science and Technology.
NELINET	-	New England Library Network.

N I H	-	National Institute of Health.
NISSAT	-	National Information System for Science and Technology(India).
N L M	-	National Library of Medicine.
N R S A	-	National Remote Sensing Agency.
N S A	-	National Security Agency.
N S F	-	National Science Foundation(USA).
OCLC	-	Ohio College Library Centre.
ORBIT	-	Online Retrieval of Bibliographic Information Time-shared.
OSIS	-	Office of Science Information Service.
OSTI	-	Office for Scientific and Technical Information.
PEBUL	-	Project for Evaluating the Benefit from University Libraries.
PSAC	-	President's Science Advisory Committee (USA).
RECON	-	Remote Console
SATCOM	-	Committee on Scientific and Technical Communication.

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S D I	-	Selective Dissemination Information.
S D S	-	Space Documentation Service.
SLICE	-	South-eastern Library Inter-State Co-operative Endeavour.
SOLINET	-	South-eastern Library Networks.
SPSTL	-	State Public Scientific and Technical Library (USSR).
STISEC	-	Scientific and Technological Information Services Enquiry Committee (Australia).
TOXICON	-	Toxicology Information Conversa- tional Online Network.
U D C	-	Universal Decimal Classification.
UNCSTD	-	United National Conference on Science and Technology.
UNDP	-	United Nation Development Programme.
UNESCO	-	United Nations ^{Educational} Scientific and Cultural Organizations.
UNISIST	-	World Science Information System.
VINITI	-	All-Union Institute of Scientific and Technical Information.
W L N	-	Washington Library Networks.

ABBREVIATION OF JOURNALS

ALA Bull	: American Library Association Bulletin.
Am Libr	: American Libraries.
Ann Lib Sc Doc	: Annals of Library Science and Documentation.
Aslib Proc	: Aslib Proceedings.
Can Libr J	: Canadian Library Journal.
East Libn	: Eastern Librarian.
FID News Bull	: International Federation for Documentation News Bulletin.
Her Lib Sc	: Herald of Library Science.
IASLIC Bull	: Indian Association of Special Library and Information Centre Bulletin.
Indian Libn	: Indian Librarian.
Indian Lib Asso Bull	: Indian Library Association Bulletin.
INICAE	: International Information Communication and Education.
J Ame Soc Inf Sc	: Journal of American Society for Information Science.

- J Doc : Journal of Documentation.
- J Lib : Journal of Librarianship.
- Lib Assoc Record : Library Association Record.
- Lib Herald : Library Herald.
- Libr J : Library Journal.
- Lib Sc Doc : Library Science with a slant to Documentation.
- Lib Qr : Library Quarterly.
- Lib Trends : Library Trends.
- Spec Libr : Special Library.
- Unes Bull Lib : Unesco Bulletin for Libraries.
- Unes Inf Sc Lib Arch
Admn
- Wilson Libr Bull : Wilson Library Bulletin.

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INTRODUCTION

Today there is unprecedented proliferation of literature embodying knowledge and learning. There has been tremendous growth of the knowledge industry in recent years. Distances have been annihilated and so the progress, advancement, research and discoveries made by one country are made available to other countries without any loss of time. The concept of library and its functions have changed with the change of the society. We have moved right from the practices of library economy and library science to the challenging field of documentation and information without much of opposition from the academicians, scientists and specialists in various fields.

There was time when research work was confined to only a few individuals - scientist and scholars and the literature at their disposal was scanty. In the words of Dr. S R Ranganathan " In the far off days, the scholars carried their library in their mind, so to speak. There were only a few documents and few scholars." About five centuries ago a change came. Printing with moveable metallic types was invented which enabled production of copies of same documents at a low cost. It may be said

that wide diffusion of knowledge started with the invention of printing. Upto the middle of the 17th century there was no periodical medium for the dissemination of new scientific knowledge. However, with the inception of the first scientific periodical Journal des Savants which was launched in Paris in January 1665. [1] Knowledge began to be recorded and disseminated at regular intervals of time. Since then new ideas and thoughts are being communicated through thousands of periodical publications appearing in variegated form and covering all the geographical regions of the world.

Gradually, with the advent of printing press the increase of recorded materials becomes so great that the magnitude and multitude of the scientific and technical literature continued to increase at an exponential rate. The situation has further aggravated owing to an increasing emphasis on the interdisciplinary research and the natural phenomenon of scatter seepage, multifocalness and multilingualness of the documents; and above all there were language problems. To tackle all these issues, the traditional library techniques failed to keep pace with this mass development and a new term 'Documentation' was introduced with newer techniques which replaced the old concept of librarianship.

Documentation as a discipline, separate from librarianship, has been firmly established on the Continent of Europe towards the end of 20th century. It may be pointed out that the work of analysing and indexing articles appearing in periodicals has continued to be considered as one of the most important documentation activities. Since the Second World War there has been a noticeable change in the concept of library service. The emphasis on search has shifted from books to periodicals. The rapidly growing number of scientists and other specialists actively engaged in national and international research and development programmes, coupled with certain communication difficulties, creates a danger of wasteful duplication are well known. Both this fact and the constantly increasing needs of the world's scientific and technical community for quick access to the information required, as well as for its prompt evaluation and retrieval, make effective international cooperation in the field of scientific and technical information and documentation vitally important. [2]

Librarianship formerly almost entirely concerned with access to information retrieval in books and periodicals is now embracing studies of information retrieval in its widest sense. Documentation, which emerged as a body of techniques, designed to give access to specialized

information contained in journals, reports and other documents and for their reproduction, is now at the centre of spectrum of studies which includes both the more traditional forms of librarianship and highly technical studies of the elements and processes of communicating specialized information which are the domain of the information scientist, particularly in the mechanization of library and bibliographical records, have moved with amazing rapidity during the last 10 years.

The explosion of knowledge and the consequent increase in the amount of scientific and technical information particularly after Second World War virtually made it impossible for any library, howsoever generously supported financially, to be really comprehensive in its document collections to meet the varied and complex needs of its users. In addition, with the increase in scientific and technical literature while revolutionizing the life of modern man, there has also been steep rise in the cost of books, periodicals and other publications particularly those imported from the developed countries. This has created serious financial problems for libraries in the developing countries. There is an urgent need in those countries to utilise the available limited financial resources in a most effective and economical manner.

The universe of knowledge is embedded in variegated types of documents and is ever growing. There has been an unprecedented growth of scientific knowledge since the beginning of this century, and with the change of society another new term Information Science has crept into the profession with wider significance as the general label for Documentation. The term Information Science was first used in 1959 in U S A and the American Documentation Institute (ADI) changed its name to American Society for Information Science (ASIS) in 1968 and the title of its journal - American Documentation to Journal of the American Society for Information Science (JASIS) in 1970. However, after much chaos and confusion, the new term 'Information Science' has been accepted by most of the countries of the world to denote modern library activities. But in USSR, the name adopted was Informatics. The Russians were quite right in relating information science to the study of society, but they erred in limiting it to scientific inquiry unless by science they meant all forms of creative cerebral activity.

Information is now considered to be the most essential commodity. The storage and retrieval of information by manual methods is now becoming out of date. The recent application of computer technology to the handling of information has tremendously affected the free-flow of information across the space barriers. Information centres,

information networks/systems data base/bank at different levels have been established for diffusion of scientific information to reach the right user at the right time. The right to have information is the magic key to lead the country for an overall development in scientific research with successful technological application of these research results leading to the complete industrialisation of the country. But there are economic problems.

Moreover, due to economic problems both the developed and the developing countries are now constantly subject to economic pressure and have been awakened to the necessity of reaching their objectives with the minimum of fragmentation and waste. In these circumstances, the extraordinary dynamics of information gives rise to economic pressures upon libraries and information/documentation centres for coalescing into a network in order to share the resources rather than duplicating them. Another point is the soaring cost of reading materials as against tighter budgets which would force libraries/information centres to form network system and adopt resource-sharing. If this can be successfully planned much of the local purchases can be eliminated, as the local libraries can safely depend on resource sharing network for access to those materials that are needed to satisfy the

information needs of the clientele. A Kent [3] very early describes resource sharing as a mode of operation whereby the library materials are shared in common by all members of the co-operating libraries.

Information now becomes a vital component of all developmental activities of a nation. Therefore, organization of information system, particularly planning an infrastructure for national information system should be one of the top priorities in the national development plans. Further, the planning of a national information system itself requires an organized and well defined procedures for collection and analysis of information on various factors that effect an information system.

The UNESCO/UNISIST programme, has emphasized for the information system of science and technology to developing states in 1971 in the following words:

- * Developing countries require scientific and technical information systems of their own, suited to the type, capacities and location of the producers and users of such information, and giving emphasis to the type of knowledge most needed for social and economic development.

Such internal systems must be effectively connected with the information networks of the highly developed countries." [4]

In this modern age, it has been realized all over the world that, one of the basic requirements of every developing country is a network of information activities, which specializes in planning and co-ordinating the growth of scientific and technical information systems necessary to meet the needs of economic and social development of the nation, and at the same time international organizations engaged in documentation and information activities have also sensitized many countries to restructure their organization of documentation and information services. National planning of library and documentation/information services have now become an accepted responsibility of all governments.

The industrialised countries of the world are increasingly recognizing the necessity for network planning, and side by side the developing countries with the help of international organizations develop their information infrastructure through network planning. Planning science and technology for development in a systematic manner is itself a relatively new concept. In developing countries, governments have a major responsibility for providing information services. To achieve a truly national information system, governments shall have to formulate a general information policy to which all organizations participating in these activities can subscribe.

" The primary objective of an information policy is to provide research workers, scientists, engineers, technicians and managers and more generally all who have some part to play in scientific activity with access to information they need and this as economically as possible."

[5] The basic plan of action is to build a national information network on the existing infrastructure, by various services, developing their strong points, encouraging private and public initiative and filling in existing gaps. The government should clearly state its area of responsibility and the means it intends to employ such as specialized services, incentives, co-ordinating machinery, financial arrangement, etc.

Unlike some countries, Bangladesh has not laid down a policy to govern the growth of such services, but it has been noticed that some interest has been taken by the Government of Bangladesh to strengthen the National Scientific Documentation Centre which is evident from Unesco Report of 1975 [6] in which the Government of Bangladesh requested Unesco's assistance under the participation programme 1973/1974 to support the development of the Bangladesh National Scientific and Technical Documentation Centre (BANSDOC). Later on a proposal was made by the recently established NCST under the Science and

Technology Division of President's Secretariat, Government of Bangladesh in 1979 for the establishment of 'Information Documentation and international Co-operation Wing', along with four other wings as proposed by Division. However, it has been observed that the newly envisaged goal of NCST will take sometime to materialise and sufficient discrepancy between the service provided and the real needs of the readers shall exist, as a result of which there is somewhat under utilization of locally produced information for development purposes.

The development of information services in Bangladesh is not keeping pace with such development in the industrial countries. There are institutions of more or less local importance, such as libraries, documentation centres, computer centres, but there exists a complete lack of information network by which co-ordination and resource sharing could be effected for the mutual benefit of each of the existing libraries. On the whole, Bangladesh is not taking full advantage of modern possibilities of data processing storage and retrieval. The quality of services is low due to the use of conventional methods of information retrieval, loosely coordinated activities and above all the new concept of information and particularly of systematically organized technological information has not

clearly made its entry in our country as a major objective and still plays a minor role in the general flow of communication.

Further, the development of science information systems, particularly of modern methods and technology lags behind the development of research in Bangladesh mainly because no appraisal has been made of the real role of information in the development of science and for insufficient financial investments in this activity. The documentation and information services have failed to create sufficient response in our country only because our policy maker's are not well conversant about documentation and information activities. As a consequent they lay little emphasis on it at the time of formulating state policy, and as such the policy makers of our country should be made aware of documentation/information activities, experienced and qualified persons from the concerned lines should be given scope and facilities to represent in the planning body of the country.

Therefore, the purpose of my thesis is to fill up an important gap proposing a proposal of networking system of information science taking into consideration initially the field of Agriculture, Engineering, Health Services, Pure Science etc. and state of development of the already

available documentation and information services and the possibilities of establishing new centres in areas where they do not exist.

Besides, the historical development of Documentation and Information activities in the light of total educational, political and economic developments of the nation has been attempted to evaluate the processes and problems in the growth of Libraries, Documentation and Information activities, with reference to those of the three developed countries of the world. These are, UK, USA and USSR. I have also studied the documentation and information activities of India, a developing country but basically advanced in this area and also a neighbouring country of Bangladesh sharing the same cultural foundation.

In my observation, there is a good reason to give first priority to establishing clearly the networking systems for Science and Technology in Bangladesh so that library development may be given its due place in national developmental plans. These services must be planned to meet projected future requirements in situations where national development may be proceeding rapidly, for it is becoming increasingly clear that the concepts underlying information networking plans for our country might be based

in context to developed/developing countries where network system for science and technology have been established following the well developed guidelines.

It is also mentionable here that many international organizations (governmental and non-governmental) try, within the framework of their activities, to improve the implementation of national systems for information services in developing countries. There are activities of some international governmental organization like Unesco and non-governmental organization such as the organization of Economic Co-operation and Development (OEC), the International Federation for Documentation (FID), the International Federation of Library Association (IFLA), International Council of Scientific Unions (ICSU) and others which assist developing countries in their efforts. [7]

The establishment of information services in developing countries through technical assistance can be an important part of the permanent programme of international organizations particularly the specialized agencies of the United Nations. In many cases, this is already done, but some countries have not yet fully realized the value of such assistance and have not requested it. The management of such technical assistance requires an integrated

information policy in the country being assisted.

As the concept of documentation and information system has not yet been fully developed in Bangladesh, though there are a large number of research institutes/ organizations of prestigious values, but they are loosely coordinated due to lack of a centrally organized information network.

It is observed that recently a few studies in this field have been undertaken in the foreign countries as for example a Ph.D. work on "A Prescriptive Model for Planning a National Scientific and Technical Information System for Egypt" was undertaken in the University of Pittsburgh, in 1979, but no serious research work on 'Documentation and Information' activities in Bangladesh has been carried out so far, except the present work.

This research work being a combination of fundamental and empirical study has been divided into four main chapters. In addition, appendixes, graphs, maps and references are included at the end of each chapter.

The first chapter gives the brief historical background of Bangladesh with geographical location, Climate, Agriculture, Mineral resources, Communication System,

Education and Culture, Industrial and scientific activities. It then describes the present condition of the Documentation activities, Patents, standards including the initiatives taken by the Government of Bangladesh in establishing the National Council of Science and Technology (NCST) and its future activities. Some description of the Health services with its present condition of documentation and information activities have also been included. Financial expenditure of the annual budget in the First Five Year Plan from 1973-74 to 1977-78 in education sector has also discussed.

The second chapter, is divided into two parts: Part I deals with the comprehensive description of the Genesis of Documentation. How the term documentation has crept into the field of library science, its concept, scope and widely accepted definitions and development, and further deals with the modern use of the term Documentation and how this concept changed into Information Service, Information Retrieval and Storage and lastly to Information Science and Informatics.

Part II deals exclusively with the need for documentation and recognition of documentation activity at the national and international level which is with the establishment of Documentation Centres in most of the countries of

the world after the Second World War with the help of Unesco both at the national and international level of further development of documentation, and library activities.

Third chapter is concerned with comprehensive descriptions of the international as well as national information activities particularly with reference to advanced countries like U K, U S A, U S S R and a developing country like India. This chapter explains how this information system developed after the World War II, and is becoming a national resource which together with physical, economic, manpower and technical resources is needed for the development of a country and of the society. The use of information being a vital element of the national development has also been specified and the national and international information systems such as NATIS, UNISIST, AGRIS, INIS, DEVSIS have also been mentioned.

The inter-governmental conference for the establishment of the world science information system (UNISIST) took place in Paris in 1971 and an inter-governmental conference on Planning National Documentation, Library and Archives Infrastructure was held in September 1974, where emphasis was initiated to promote and create national information systems (NATIS) in such a way as to ensure co-ordination at the

national level and to prepare the basis for active participation in International Nuclear Information System (INIS) and International Information System for the Agricultural Science and Technology (AGRIS) and their assistance towards national information system. MEDLARS which is the computer-based information system designed to cope with the tremendous growth of bio-medical literature of the world, has also been discussed. Besides, national information system of India a developing country, has been described and also suggested for taking as a future model for Bangladesh in adopting a NISSAT plan, in taking advantage of India's experience in the field of information system for science and technology as because, India being a neighbouring country of Bangladesh having more or less related culture and education.

The 4th chapter being the last chapter of this work has been divided into two sections. Section I deals with the national STI system. The concept of information and particularly of systematically organized technological information has not yet clearly made its entry in our country as a major objective and as such are still in its infancy in the general flow of communication. Therefore this section, begins with by delimiting the meaning and general roll of the information system, need for information system, its objectives, functions, manpower resources, financial

like Bangladesh need proper planning in establishing information network for promoting socio-economic development by making full use of scientific and technical knowledge.

As such the present research work "Documentation and Information Activities in Bangladesh" is justified in which I have tried to make this work well documented. This is a pioneering work and would be useful for those interested in the study, planning and establishment of the national information networking system for science and technology following the well developed guidelines of the UNISIST/NATIS etc. Further in near future, this systems would be in use in formulating information system in other areas like social sciences and humanities as well.

I am confident that this work would be of immense value to librarians, information specialists, planners and administrators of Bangladesh.

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CHAPTER I

INFORMATION ACTIVITIES IN BANGLADESH

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INFORMATION ACTIVITIES IN BANGLADESH

The People's Republic of Bangladesh appeared on the world map as a sovereign state on December 16, 1971 following the war of liberation from March 25 to December 16, 1971. The area constituting the country was under Muslim rule for 560 years i.e. from 1197 to 1757 A.D. and passed into British hands after the defeat of Nawab Sirajuddowla at the Battle of Plassey on June 23, 1757. [1] During the British rule the Province of Bengal comprised of present Bangladesh and the Indian state of West Bengal. With the ending of British rule in 1947 the country was partitioned and Bengal province was bifurcated. The eastern wing became East Pakistan. But very soon differences arose between East and West Pakistan. The East Pakistan fought for independence against the colonial rule of West Pakistan and after a blood-bath a nation politically sovereign has come into existence as the Peoples' Republic of Bangladesh.

The country at birth had inherited a poor undiversified mixed economy characterized by an undeveloped infrastructure, stagnant agriculture and a rapidly growing population. Bangladesh is primarily an agricultural country

and has one of the finest soils in the world.

Bangladesh lies in the north-eastern part of the south-Asian sub-continent roughly between $20^{\circ}34'$ and $26^{\circ}38'$ north latitude and $88^{\circ}01'$ and $92^{\circ}41'$ east longitude. [2] The country is bounded by India on three sides - east, north and west. There is also a small boundary with Burma on the South-east. In the South lies the Bay of Bengal and to the north-east lies the broad mass of the Assam Range on the Shillong Plateau. [3] And the snow-capped majestic Himalaya rampart effectively bearing all communication with its northern neighbours like Tibet and China where the vast riverine delta rolled down south to the Bay of Bengal.

More than 85% of the area of Bangladesh is flat alluvial plain crisscrossed by the mighty Padma, Meghna, Jamuna and their innumerable tributaries and distributaries. These rivers are an important part of the physical environment of Bangladesh and play a very significant role in the life of the people. They provide cheap means of transport.

Low hills and hillocks border the plains in Sylhet which range in elevation from 100 feet to 300 feet in the north. In the south-east the Patharia hills rise to 800 feet. There is an extensive hilly area in the

district of Chittagong Hill tracts in the south-east. Here the hills are composed mainly of soft sand-stones, shell and clays. They run north and south with an average elevation of about 2000 feet. The highest peak in Bangladesh is the Keokradong (4,034 feet) at the south-eastern extremity of the area.

Climate:

Bangladesh enjoys generally a sub-tropical monsoon climate. Six seasons in a year, three, namely: winter, summer and monsoon are prominent. Winter which is quite pleasant begins in November and ends in February. The temperature in winter is not usually runs fluctuation daily from about 45°F - 55°F minimum to 75°F - 85°F maximum. It has been noticed maximum temperature in summer months being 98° and occassionally it rises upto 105°F or even more. Monsoon starts in June and continues upto October. This period accounts for 80% or the total rainfall, whereas the average annual rainfall in Bangladesh varies from 50" to 200". [4]

Population:

The population of the country in March 1981 stood

at 90 million, the percentages of rural and urban population being around 87% and 13% respectively. Annual growth rate is about 2.5%. By 2000 A.D. the population is expected to be around 121 millions, but country-wide intensive family planning measure is aimed at reducing the growth rate (NRR-1 by 1990). Density of population is about 1656 per sq.miles. Sex ratio is 106 males per 100 females. Civilian labour force as percentage of population (in 1974) is 35.2 - 50.6 in the case of males and 18.7 in the case of females. Literacy rate is 24.3% (1979-80). More than 85% of the population are Muslims. Other religious groups are Hindus, Christians, Buddhists etc. [5]

Capital :

Dhaka is the capital and the largest metropolis (160 sq.miles). Chittagong, the port city is the second largest. Dhaka has a population of about 3.5 million while Chittagong about 1.4 million. Rajshahi, Khulna, Barisal, Sylhet and Mymensingh are some of the major towns. The country Bangladesh has a unitary form of Government and for administrative purposes the country is divided into four divisions and there are 21 districts under the four divisions.

Agriculture & Main Crops:

Agriculture is the main occupation of the people employing 80% of the labour force. This sector directly contributes 54% to the gross domestic products. Rice, wheat, jute, sugarcane, tobacco, oilseeds, pulses and potatoes are the principal crops. Bangladesh produces about 85 million lbs. of tea per year, a sizeable quantity of which is exported to foreign markets. Bangladesh produces about 6 million bales of superior quality jute annually (1 bale = 400 lbs.) and 75% of the export earning come from raw-jute and jute manufactures. [6]

Fish Wealth:

Bangladesh is rich in fish wealth. [7] In the innumerable rivers, rivulets, canals, tanks and other low lying areas and paddy fields remaining under water for about 6 months in a year covering nearly 12 million acres, tropical fish of hundreds of varieties abound. Rice and fish constitute an average Bangladeshi's principal diet. A countable amount of fishes are exported to foreign countries. With the Bay of Bengal in the south the country enjoys geographic advantage for marine fishing. Thoughts are being given by the Government of Bangladesh in the light

of scientific and technical way, how to increase fish production from the inland and marine sources which may increase the foreign earnings.

Mineral Resources & Energy:

Bangladesh is not poor in mineral resources. By now (1982) 12 gas fields have been discovered from which natural gas is available to meet the requirements of Industries, power-generating plants and households. Fertilizer factories in operation including the giant petrochemical complex at Ashuganj in Comilla district and those to be set up are and will be using a huge quantity of natural gas. Production of gas was 49,936 million cft. in 1980-81 and the proven gas reserves in 12 gas fields so far discovered equal 11.11 trillion cft. which is roughly equivalent to 440 million tons of coal. About one percent of gas is being consumed annually at present. Coal deposits have been found and efforts are under way to exploit them with international assistance. Electricity is produced by thermal and hydro-electric processes. Total generation of electricity amounts to 2,662 million kilowatt hours in 1980-81. The solitary hydro-electric project producing 120 m.w. is located at Kaptai in the Chittagong Hill-Tracts.

Limestone, the basic raw material for the production of cement, has been found in some places and more cement factories are being set up to utilize the same. Other minerals found include hardrock, lignite, silica sand, white clay, etc. There is possibility of oil deposit in the country and serious efforts are being made for its exploration. [8]

Communication System:

Bangladesh has about 1,800 miles rail-road, 7,000 miles paved road and roughly 5,000 miles of perennial water ways. [9] With the development of road transport, efforts are under taken to develop the water transport system. In fact, rivers are the lifeline of the nation in that they provide the cheapest means of transport, water for agricultural operation and ensure sufficient supply of fish for her people. Steps have been taken to put more mechanised vessels into service and modernise the existing country boats. Regarding air transport facilities, Dhaka is connected by air with London, Athens, Bangkok, Kuala Lumpur, Singapore, Karachi, Bombay, Calcutta, Dubai, Jeddah, Kathmandu, Rangoon, Tokyo, Amsterdam and Daharan by her national airline (Biman). The two seaports of Bangladesh are Chittagong and Chalna. Among the river

ports and terminals, Dhaka, Narayanganj, Chandpur, Barisal, Khulna, Aricha, Gualando, Nagarbari, Serajganj ghat, Jagannathganj ghat, Bhairab Bazat, Bahadurabad and Fulchari ghat are important.

Bangladesh has a network of radio and television broadcasting. The television system was introduced in 1965 and since then sub-stations have been set up in Chittagong, Sylhet, Khulna, Rangpur, Mymensingh, Natore, and Noakhali districts. The colour Television system was introduced on 1st December, 1980. [10] An extensive telecommunication systems has connected the capital city with other places within the country. Besides, telecommunication links have been established with major cities of the world through the earth satellite ground stations at Betbunia in the Chittagong Hill-Tracts and Talibabad (Kalia Koir) in Dhaka district of Bangladesh.

Education & Culture:

Bangladesh also occupies an important position in the educational and cultural fields in South Asia. There are six Universities in the country of which two are specialized, one each for agriculture exclusively and other for engineering and Technology. The general type Universities

are located in Dhaka, Chittagong, Rajshahi, and Savar (near Dhaka). The number of students in the Universities is around 32000 and the number of teachers around 2400. A programme has been taken up to establish an Islamic University. There are nearly 650 Intermediate and Degree Colleges and Vocational Institutions and 9,000 Secondary Schools. At present there are 2,684 Madrasahs in the country. Efforts are underway to modernise Madrasah education by introducing Science and vocational courses. There are 10 medical colleges and one dental college. Engineering colleges are located in Dhaka, Chittagong, Rajshahi and Khulna. At present there are around 44,000 Primary Schools with an enrolment of 8.2 million. Co-education facilities are available at the college and University levels. Besides, there are Art College, Law College, Colleges of Music and Fine Arts in the country. [11]

Bangladesh people are great enthusiasts in sports and games. Football, Basketball, hockey, badminton, cricket, kabadi, swimming, boat racing and lawn tennis are some of the most popular outdoor games. The Government has created the sports and culture division for providing necessary assistance towards development of sports and Games in the country.

Scientific Activity:

An important landmark in the scientific activities

in Bangladesh is the establishment of the Asiatic Society of Bangladesh. This society was established in 1951 then in Pakistani period following the Royal Asiatic Society of Bengal which was established in 1784. [12] The society has to its credit a large number of publications among which the following may be mentioned. (The list of publication of this society has been shown in appendix 'A' at the end of this ^{thesis} chapter).

There has been research activities in the scientific departments and institutes of the Government of Bangladesh such as the Survey of Bangladesh, the Zoological Survey of Bangladesh, Botanical Survey, Geological Survey, Archaeological Survey and the Meteorological Department etc. All the institutions/research organizations which exist, under various ministries/departments are stated in succeeding section.

Industrial Research:

During Pakistani regime the government had to take an interest in the development of industrial research. It set-up a bureau for making a survey of industrial activity, and this was the fore-runner of the Council of Scientific and Industrial Research (CSIR) which was established in 1953 and Dr. Kudrat-e-Khoda a world renowned scientist was

its first Director. The CSIR developed two more research laboratories - one being in Chittagong and the other in Rajshahi districts of Bangladesh excepting Dhaka. The CSIR is also sponsoring research activities in the laboratories of universities as well as other research institutions in Bangladesh.

Industries :

Bangladesh being an agricultural country, it possesses large-scale industries based on indigenous raw materials. The important industries such as Jute manufacturing, paper and newsprint, Carpet making, rayon, chemical fertilizers, sugar, cement and leather tanneries are countable. Other notable industries are cotton textile, handloom industries, engineering, steel and re-rolling, oil refinery, electric cable and ship-building. Among the cottage industries, handlooms, carpet making, shoe making, coir, bamboo and cane products, earthenware, brass and bell metal products, small tools and implements, handicrafts etc. are important.

The industrial investment policy of the government is aimed at developing industries within the shortest possible time. With end in view the government has decided to keep only the key industries in the national

sector and leave the rest to the private sector. To boost the process and attract local and foreign capital the government of Bangladesh has practically provided various other incentives to the private entrepreneurs. Industrial sector contributing around 10% of the GDP, is dominated by jute processing which in turn contributes about third of value added by all manufacturing. [13]

The country at its birth (December 16, 1971) inherited a poor undiversified economy characterized by an under-developed infrastructure, stagnant agriculture and a rapidly growing population plus the widespread destruction of life, property, industry, trade and commerce and also communication system in the 9-month war of Liberation. International communities came forward with generous help for this war-torn nation. Although an annual plan of Taka 500 crore was prepared for 1972-73 the actual expenditure was to the tune of Taka 400 crore which was mostly spent for relief and rehabilitation, reconstruction of the roads and bridges and financing of the urgent on-going Projects. Against this background Taka 4450 crore was prepared and launched for the first Five Year Plan of Bangladesh (1973-74 to 1977-78, an allocation for industries in Public Sector was Taka 7,380 million. [14]

Despite the stress and strains experienced during the first few years of the first Plan, the country acquired greater stability by the end of the Plan. But the existence of a large number of on-going or unfinished projects restrained the Second Five Year Plan's priorities. The sole objective of the Second Five Year Plan's topmost priority has been given to the development of the country and the development outlay for Second Five Year Plan (1980-85) in industrial sector was estimated Taka 3845 crores of which Taka 2345 crores allocated for Public sector and Taka 1500 crores for private sector. [15]

At present industrial statistics and data particularly information regarding demand, sanctioned capacity utilised, production etc. are not properly collected nor available. The system of collection and collation of industrial information will be developed and strengthened so that prospective entrepreneurs and other interested agencies can get the required information easily.

Jute :

Jute, the golden fibre, is the most important cash crop and at the sametime the biggest foreign exchange-earner of Bangladesh. It brings cash money to 35 lac

farmers, employ 2 lakhs of people in the mill and one lac people in the trade. Foreign exchange earnings through the export of raw jute and jute manufactures are over 80% of the total export of the country in a year. The prosperity of a large section of the people is dependent on the fair price of the crop as this is practically the only cash crop of Bangladesh.

Bangladesh used to enjoy almost a monopoly of this fibre on a commercial scale even a few years ago, as will be evident from the fact that its share in the export market was 80% in the year 1947-48 but in 1975-76 it occupied only 25%. This fall in world market is due to the fact that many countries have started growing jute and allied fibres extensively. Whereas Bangladesh has not been in a position to substantially increase her production and export. [16]

Jute Research:

Jute being a cash crop, received the attention of the Government in the early years immediately after the creation of the Agriculture Department. By 1900 a fibre expert was appointed by the Government of undivided Bengal at the direction of India. The Royal Commission of Agriculture made recommendation in 1928 for the establishment

of a Jute Research Institute for Agricultural and Technological Research materialised by 1938. At that time a full-fladged Indian Jute Research Institute was established at Dhaka and the Technological Laboratory was set up at Taliganj in Calcutta. And at this time all the Research activities pertaining to Jute was shifted from the provincial Government to the Central Government and till 1947 when almost all scientific staff opted for India and the work was practically discontinued for some period.

After partition of India, Jute research was again started at Dhaka by creating the Central Jute Committee in 1951, and a Research Institute was built up at Tejgaon, Dhaka in 1957, since then research are being carried out on agricultural and technological aspects where a large number of scientists are working.

Jute Board was set-up in 1949 and since then this had developed and became a very powerful and effective organization. It reorganized and regulated jute trade. It also collected information about the production of raw jute and manufactured products. It regulated the entire jute trade. In recent years a number of organizations have established to assist in stabilizing the jute price in the country. These are:

- 1) Jute Trading Corporation
- 2) Jute Price stabilization Corporation
- 3) Jute Marketing Corporation

These three organizations were assisted by Jute Board. Financial assistance to these trading Corporation were given by the Jute Board, Bangladesh National Bank and all other Commercial banks.

Jute Industry:

There are now 77 jute mills in Bangladesh [17] spread all over the country but situated mostly near about Narayanganj, Khulna and Chittagong. The jute industry in Bangladesh has not yet fully grown up. It is still a struggling stage. Its problems relate to its ability to compete successfully with well established jute industry of the world.

To compete with the world market the jute production of Bangladesh should include the scientific production through application of science and technology. The information, therefore is needed on the farmer's field and must reach there, and the information must be in such a package that it can be utilized at once. The Government of

Bangladesh should approve a scheme for setting up a Sectoral Centre on Jute Technology including Tea and Fisheries Sectoral Centre which has already been suggested in the 4th chapter of this thesis. When this Centre will be materialized, more such centres should be planned such as Sectoral Centre on Patents, Ship-building, Drug and medicine and Food Technology etc.etc. in context to the NISSAT (National Information System for Science and Technology) of India.

But during the Pakistani period although successive five year development plans were implemented, Bangladesh which was known as East Pakistan at that time did not get its due share as most of the development work was concentrated in the western wing. Only a few large scale industries like Jute, Cotton, Textile, paper and newsprint, and some medium and small industries were set up and limited socio-economic infrastructure was created but these were far short of the actual requirements. The country remained as an undeveloped region even after two and a half decades of Pakistani rules. It has been seen from the statistical year book of Bangladesh published by the Bangladesh Bureau of Statistics, Ministry of Planning in 1979 that the all scientific organizations, research institutes, universities, etc. have been put under various ministries, such as:

Under President's Cabinet Secretariat-

1. Bangladesh Atomic Energy Commission;
2. Bangladesh Council of Scientific and Industrial Research (BCSIR);
3. Bangladesh National Scientific and Technical Documentation Centre (BANSDOC);
4. Museum of Science and Technology and
5. National Science Library(recently established) .

Under the Ministry of Mineral Resources-

1. Geological Survey of Bangladesh;
2. Bureau of Mineral Development;
3. Bangladesh Petroleum Corporation.

Under the Ministry of Industries -

1. Bangladesh Sugar and Food Industry;
2. Bangladesh Steel and Engg. Corporation;
3. Bangladesh Standard Institution;
4. Bangladesh Sugarcane Research Institute

Under the Ministry of Jute -

1. Bangladesh Jute Research Institute;
2. Jute Mills of Bangladesh.

Under the Education Ministry -

1. 6 Universities ;
2. University Grants Commission;
3. Bangladesh Technical Education Board;
4. Madrasha Education Board.

Under the Ministry of Agriculture & Forest -

1. Bangladesh Agricultural Research Institute;
2. Bangladesh Rice Research Institute;
3. Bangladesh Forest Research Institute; and
4. Bangladesh Agricultural Research Council.

Under the Ministry of Fisheries and Livestock -

1. Bangladesh Fisheries Institute and livestock .

Under the Ministry of Health Services -

1. Bangladesh Medical Medical Research Council;
- 2. Pharmacy Council of Bangladesh;
3. Bangladesh Diabetic Research Institute;
4. Bangladesh Nursing Council;
5. Institute of Post-Graduate Medicine and Research;
6. National Institute of Preventive Medicine;
7. Institute of Disease of Chest;

8. Cancer Research Institute;
9. Bangladesh State Medical Faculty and
10. Bangladesh State Medical Services (Directorate of Health Services).

Scientific and technical research is mainly financed by the Government, universities and industries. In terms of research expenditure, the government had spent about Taka 3,160 million for education in public sector and Taka 224.48 million in private sector separately from the total out lay of Taka 39,520 and Taka 5030 million respectively were estimated in the First Five Year Plan i.e. 1973-74 to 1977-78. To have a clear idea a table has been given in which expenditure in respect of Education, Agriculture and Health for the First Five Year Plan of Bangladesh i.e. from 1973-74 to 1977-78 had been estimated. [18]

The plan suffered many setbacks. There was inflation and recession in developed countries from whom Bangladesh expected much of the foreign aid for the reconstruction and development of the economy. The plan was, therefore revised and its priorities restructured in the middle of the plan period and a "hard core" plan for Taka 3200 crore was formulated for the last 3 years (1975-76 to 1977-78) of the plan period.

Table 1.1

Table showing the expenditure of education,
agriculture and health services for the
First Five Year Plan of Bangladesh

S e c t o r	1973-74 to 1977-78 Five Year Plan	
	<u>Allocation</u> Taka in Million	<u>Percentage</u>
1. Agriculture, Water Resources and Rural Development	10,410	26.30
2. Industries	7,380	18.70
3. Power, Natural Resources	5,220	13.20
4. Transport	5,280	13.6
5. Communication	1,140	2.9
6. Physical Planning and Housing	3,150	8.0
7. Education, Manpower & Training	3,160	8.0
8. Health & Social Welfare	2,200	5.6
9. Family Planning & Population Control	700	1.8
10. Others	880	2.0
T o t a l	39,520	100.0

Despite the stress and strains experienced during the first few years of the First Five Year Plan, the country acquired greater stability by the end of the plan.

The Second Five Year Plan starts from the year 1980-81. [19]

The sole objective of the Second Five Year Plan (1980-85) is reduction of poverty by a significant extent and creation of conditions which would help eliminate poverty by the end of this century. With this end in view topmost priority has been given to the development of rural areas where 87% of the people live. Sectoral allocation of the Second Five Year Plan and its major physical targets are shown in the table-2 (Appendix-8 at the end of this ^{thesis} chapter).

Bangladesh Atomic Energy Commission:

Bangladesh Atomic Energy Commission (BAEC) is a national research centre under Science and Technology Division, Cabinet Secretariat, Government of Bangladesh. With the setting up of the Atomic Energy Commission under the Atomic Energy Act, there are four centres in Dhaka, Chittagong, Rajshahi and Mymensingh Districts of Bangladesh. This Commission has recommended for establishment of an

'Institute of Nuclear Science and Technology for Asia through RCA programmes. It has more than 300 scientists engaged in research activities.

The principal office of the Atomic Energy Commission possesses a good Library with a documentation unit at Dhaka for the use of its own scientists, research workers and provides bibliographical services, information services, photo-copying services to the user of this centre as per their request. The Commission also established another Centre at Savar near Dhaka.

Documentation Services of BAEC:

1. Bibliographical service:

Scientists, researchers, and officers of the Atomic Energy Commission, when put their request for any bibliographical services, the library and documentation unit fulfils the demand and requirements of its clientles providing bibliographical services as well as information services on scientific subject fields.

An organizational chart is enclosed at the end of this ^{thesis} ~~chapter~~ (Appendix-c).

Directorate of Archives and Libraries:

The genesis of the Directorate of Archives and Libraries of Bangladesh goes back to 1961, when it was called erstwhile East Pakistan. It was in the late of sixties that Government of Pakistan planned for the establishment of a Central Library at Dhaka in the same model of two other libraries established in Islamabad and Karachi for the purpose of depositing books under the copyright Ordinance, 1962. [*] The Central Library at Dhaka was started hiring a house (in Pakistan period) used to receive books and newspapers under 'Delivery of Books and Newspapers' section of Pakistan copyright Ordinance and was called ' Delivery of Books and Newspapers Branch' Dhaka.

The Book Delivery office at Dhaka was functioning directly under the Directorate of Archives and Libraries, Karachi under the Ministry of Education, Govt. of Pakistan. The Delivery and Newspapers Branch at Dhaka turned to be the Directorate of Archives and Libraries, for Bangladesh after Liberation in 1971. The Book Delivery Office now the Directorate of Archives and Libraries forms the

* Development scheme of the National Library of Bangladesh: Second Five Year Plan (1980-85).

nucleus of the proposed National Library for Bangladesh and the project was revised and included to the Second Five Year Plan period 1980-85.

The objectives of the National Library would as follows: [**]

1. To maintain and develop a national collection of library materials;
2. To serve as a national reference and research library;
3. To compile national bibliography and provide other bibliographical services;
4. To compile Union catalogue;
5. To be responsible for inter-library loans both within the country and internationally;
6. To serve as a centre for dissemination of information on national and international basis and to assist in general, in the field of library cooperation;
7. To serve as a coordinating and assistance centre for all libraries in the country;
8. To serve as a national photocopying centre;

** Ibid , p 1.

9. To provide scientific information and reference services to all classes of readers;
10. To provide educational and training facilities in the field of library management and administration.

It was decided that the location of the project is Sher-e-Banglanagar, Dhaka and about two acres of land have been acquired for the project and the total cost of the project was estimated Taka 465.18 lakhs i.e. US \$ 3,101,200 (approx). Annual operating recurring expenditure on the completion of the project was estimated to be Taka 9,21 lakhs, i.e. US \$ 61,400 (approx). It will be a seven-storied building. The building will be constructed in phase wise and full seven-storied building will be completed during the Second Five Year Plan period 1980-85. [***]

It is now clear to be understood that as per Government Plans and programmes a full fledged functional National Library for Bangladesh is not forthcoming before 1985. Bangladesh has already suffered a great deal due to the absence of a National Library since 1947.

NIPA (National Institution of Public Administration):

NIPA is a National Institution for Public Administration in Bangladesh. It has a good Library and Documentation Unit, which established in 1961 with the aim and object to extend library and documentation services for the personnel those who are taking training in Administration from NIPA. It has its own building situated in the Dhaka University Campus.

Present collection of this library exceeds forty thousands including books, and journals, reports etc. and this library is specialized on subject field such as International organization, Planning, Research methods, Public Administration, Personal Management, International Relation, International Co-operation etc. Besides, this library maintains 'Inter-library loan' system with other libraries of the city.

In the Library of NIPA, there is a documentation unit and the following documentation services are being provided for the greater benefit of its clients and users.

1. Current awareness services: It includes distribution of lists of new publications received such as books, journals, reports etc. are brought to the notice of the users.

2. Retrospective information services are being provided by this library as and when needed by the user.

3. Bibliography compilation services are given by preparing bibliography for its clients on request particularly in English language only.

4. Reprographic services include photocopying, copying services, printing of publications and microform reading services etc.

Documentation services provided by NIPA Library is very limited and attention should be given to improve all these services, making interlink with BANSDOC and newly found "Information, Documentation and International Co-operation Wing" under Cabinet Secretariat, Government of Bangladesh.

Bangladesh Bank Library & Documentation Unit:

Bangladesh Bank Library was established in 1962 with the aim to help the research scholar, Banker, businessman, economist in the field of economic policy, economic research, planning, statistical research, currency, international monetary relation, agricultural

researchers, industry, commerce and trade-management and researchers of the country. This library as well as documentation centre tries to support its client by publishing or other-wise disseminating general, technical and scientific information to the related subject area.

Bangladesh Bank Library is situated in a palacious building in the Head office of the Bangladesh Bank at Motijheel commercial area, Dhaka with 30 fulltime staff. In this library there is a separate documentation unit with a Documentation Officer and an Assistant Documentation officer to assist the Documentation officer. The Librarian and the Documentation officer are in the same status and above all there is an Assistant Director for Libraries of this library whose status and rank being the same of the other Assistant Director for Bangladesh Bank.

The Documentation services are being controlled by the Documentation officer and at present the following services are given to its users.

- i) Current awareness services
- ii) Retrospective information search
- iii) Bibliography compilation services
- iv) Reprography services
- v) Indexing of articles of newspapers

and periodicals is one of the important services of this Documentation Unit.

- vi) Documentation Unit also maintains clipping file of Newspapers under 132 subjects.

The following documentation equipments are available in this documentation unit:

- i) Mimeograph
- ii) Offset
- iii) Printing equipments
- iv) Photographic equipments
- v) Copying equipments etc.

Dhaka University Library & Reprographic Unit:

Dhaka University Library, is the largest library and may be called the heart of libraries in Bangladesh. It was founded in 1921 with the establishment of the Dhaka University. The Dhaka University Library being academic in character, its collection is mostly academic and scientific in nature. [20] The main library is a three storied two buildings situated at Shahabagh, Dhaka University Campus.

Dhaka University Library has two wings :

- (1) General library (Arts Section) including law section
- (2) Science section, which has been housed in a separate

building nearer to the Science Faculty for the greater benefit of students and teachers of the Science and Technology of the University.

The present collection of the library is about six lacs of volumes of books and journals including thesis and Unesco's publications. There are 40 thousand valuable manuscripts. Total strength of the library is about 200 including the university librarian with professors status, 3 Deputy librarians and 6 Assistant librarians. This library has collected rare materials for which there is a section naming rare book section which is very valuable for serious readers as well as research workers and it is a restricted section of the library.

The Dhaka University library being a repository section of the United Nations Publication is worth mentioning which is also re-organized, putting all the publications in order for the greater benefit of its users.

Dhaka University Library has a Manuscript Section and there are more than 40 thousand valuable manuscripts in Persian, Urdu, Arabic etc. which are preserved in a air-conditioned room. The staff in-charge of this section is the keeper in manuscripts with 4 Assistants of section officer status of the university.

Besides, there are Reference Section, Circulation Section, Newspaper & Periodical Section, Book ordering Section, Processing section, Administrative section and a good book-binding section of its own.

Practically at present the Dhaka University library has got no documentation division, but it has opened a Reprographic section by the then Mr.M.S.Khan who was a librarian and pioneer of library science education establishing the fullfledged library Science Department in the Dhaka University. There was also a plan for fullfledged documentation department in the library with the proposal for the post of Documentation Officer and documentation assistants, but still no step has been taken. It is painful to note that the Dhaka University library being one of the biggest libraries in the country running without the Documentation Unit with modern apparatus, which is very much essential for the modern library.

The following apparatus are available in the reprographic section of Dhaka University Library:

- | | |
|-----------------------------|---------|
| 1) Microfilm camera (35 mm) | - two |
| 2) Xerox machine | - three |
| 3) Microfilm reader | - two |

- 4) Microfilm reader-printer - one
- 5) Card duplicating machine - one
- 6) Auto-processors (film processors) for 35 mm Microfilm - one
- 7) Projection printer/Enlarger - two
- 8) Glazing cum drying machine - one
- 9) Apedeeascope - one
- 10) Lamination machine one and other small apparatus and spare parts for the allied subjects.

The following services are being provided by this Reprographic section at present:

- 1) Microfilm production services
- 2) Microfilm printer services
- 3) Microfilm reader services
- 4) Audio-visual services
- 5) Photo-copy services
- 6) Xerox copy services
- 7) Lamination services
- 8) Microfilm cataloguing services.

It is no doubt that the reprography section of the Dhaka University library providing excellent services supplying photo-copies and Xerox copies to the researchers, students and members of this University with a nominal

charges according to the demand and need. Microfilms are made according to needs and demands of historical importance and for rare-collection and as such this section possess a considerable collection of microfilms, slides and microfishches. Recently lamination service has been started in the Library by which any rotten, damp, deterioted, brittle papers and pages of books, periodicals and some worsen manuscripts etc. can be preserved in a good condition giving further longevity. It is also mentionable here that this Reprographic section has got its own cataloguer, who is responsible for processing microfilms, microfisches cards and other special materials.

The Dhaka University Library suffers from a shortage of trained personnel more or less in all sections of the library, also better facilities are needed for students and staff members.

NCST : (National Council of Science and Technology)

The role that Science and Technology can and should play in shaping Bangladesh of the future is much in the minds of administrators, scientists, industrialists and planners. The aim of the government to support Science and technology to foster economic growth has been

expressed in the Five Year Plan of Bangladesh. The introduction of the sectoral programme for power, natural resources, scientific and technological research states that " promotion of scientific knowledge and development of technology, through their increasing application, pave the way for socio-economic development in every country. Technical know-how, locally developed or imported and then adapted through research, makes possible the economic exploitation of our natural resources." However, an analysis of this concept shows that results can only be achieved by the availability of three basic elements: 1. Funds, 2. Manpower and 3. Information. Generally speaking, question pertaining to the allocation of funds and equipment and the requirements and needs for manpower, are familiar constituents of all plans for research institutes, and other similar bodies in Bangladesh.

However the Government of Bangladesh realized that the inherent strength of a nation lies in the scientific and technological skill of its people and as a developing nation Bangladesh has enormous demands on her resources which have to be managed scientifically and exploited under best technological support.

It is recognized that topmost priority to the Science and Technology be given for the economic development

of the nation and as such a local base be created so that Bangladesh becomes less dependent on imported technology and there should be a National Science and Technology Policy of Bangladesh embracing essential responsibilities such as planning, budgeting, coordination, promotion, execution and proper evaluation of Scientific and Technological Activities relevant to country's needs so as to cover the following broad aspects of Scientific and Technological development in the country: [21]

- (1) To create a condition favourable to the development of science and technology.
- (2) To develop scientific and technological capability to generate, select, adapt, absorb, use, maintain and operate technology.
- (3) To identify national needs where S & T are to be applied for socio-economic development and to tailor S & T to these needs, particularly in the area of agriculture, food, energy, power, water, petroleum and mineral exploration, population control, education, health, housing, industry, environment, etc.
- (4) To link S & T development to an effective manpower planning and integrate it into the overall national development plan.

- (5) To develop close link between producers and users of technology.

Considering all, these are the indispensable for scientific and technological development and as such National Council of Science and Technology (NCST) constituted for the overall formulation, implementation and coordination of the national scientific and technological research and development activities. All existing national Research Agencies, organizations, councils in the country shall be re-organized and shall function under the general guidance of the created NCST.

The Composition of the NCST : [22]

- | | | |
|--|----|------------------------|
| 1. President of Bangladesh | .. | Chairman |
| 2. Minister/State Minister,
Science and Technology
Division | .. | Vice-Chairman |
| 3. Two Ministers with Science/
Technology background to be
nominated by the Chairman | .. | Members |
| 4. Wing-in-Charge, Natural
Science and Energy(S & T
Division) | .. | Member
(Ex-Officio) |
| 5. Wing-in-charge, Engineering
Sciences (S & T Division) | .. | -do- |
| 6. Wing-in-Charge, Agricultural
Sciences (S & T Division) | .. | -do- |

- | | | |
|---|----|------------------------------------|
| 7. Wing-in-Charge, Information and Coordination | .. | Member
(Ex-Officio) |
| 8. Wing-in-charge, Medical Science (S & T Division) | .. | -do- |
| 9. Secretary, S & T Division | .. | Member-Secretary
to the Council |

There is also provisions for part-time members to be nominated by the Chairman to assist NCST at times of need.

NCST shall have the following functions in respect of all research institutions and sectoral coordinating Agencies/Organizations engaged in S & T activities in the country :

- (1) Preparation and review of National Science and Technology Policy and Planning.
- (2) Approval of research plans and programmes of all sectoral coordinating agencies and different research organisations.
- (3) Evaluation of S & T activities of sectoral research organizations, projects, scientists and technologists.

A maximum possible budget provision for the country's S & T activities shall have to be committed by the

nation. Considering the low level of our productivity which is due to lack of sufficient S & T input, a minimum of 5% of the G.D.P. is considered desirable for such budgetary allocation for the present.

The priorities for the scientific and technological development in the country should be identified on the basis of the above policy statement by the NCST for the formulation of appropriate S & T action plan.

The NCST has a number of responsibilities for the implementation of the policy, directives and instructions and any other matter that may be referred to it by the Government and its major task would be to place all the scientific/technological councils and organization under the control of S & T Division. The following organization are at present exist in Bangladesh: [23]

1. Bangladesh Atomic Energy Commission (BAEC)
2. Bangladesh Council of Scientific and Industrial Research (BCSIR)
3. Bangladesh Jute Research Institute (BJRI)
4. Bangladesh Space Research and Remote Sensing Organization (SPARRSO).
5. Museum of Science & Technology
6. Bangladesh National Scientific and Technical Documentation Centre (BANSDOC)

7. Bangladesh Standards Institution
8. Central Testing Laboratory
9. Bangladesh Agricultural Research Council (BARC)
10. Bangladesh Medical Research Council (BMRC)
11. Environment Pollution Control
12. Road Research Laboratory
13. Building Research Institute
14. Bangladesh Industrial Technical Assistance Centre (BITAC)

BANSDOC : (Bangladesh National Scientific & Technical Documentation Centre)

Since 1950, Unesco has been advising its Member States concerning the establishment of Scientific and Technical Documentation Centres as a means of accelerating scientific, economic and industrial development like other country, the Government of the then Pakistan requested Unesco in 1955 [24] to help in establishing a project on national basis for scientific documentation centre. Unesco, sent an expert in January 1956. [25] A.L.Gardner to make a survey for establishing the centre, who recommended the establishment 'National Scientific and Technical Documentation Centre (PANSDOC) for Pakistan. PANSDOC came under the control of the then Pakistan Council of

Scientific and Industrial Research (PCSIR). A Branch office of this PANSDOC was established at Dhaka in the Premises of the then East Regional Laboratories of PCSIR in March 1963. [26] After Liberation of Bangladesh this branch-office turned to be a national centre and was re-named Bangladesh National Scientific and Technical Documentation Centre (BANSDOC) being a unit of Bangladesh Council of Scientific and Industrial Research (BCSIR) in order to put the world literature at the disposal of researchers, professors, scientists and industrialists and in general, all those who are active in the fields of science and technology. The branch was modelled on the same lines as PANSDOC [27] and provided the following services :

- i) documents procurements,
- ii) bibliography
- iii) translation and
- iv) document reproduction.

The function of BANSDOC is " to serve as an infrastructure for an effective Research and Development Programme as a part of the overall economic development of the country." In assuming its role as a National body it has been entrusted with : [28]

1. The collection, processing and compilation of information and data in all fields of scientific research and experimental development, including natural sciences, agriculture, medicine, engineering and industrial technology;
2. The dissemination of such information to researchers active in all these fields, irrespective of their affiliations, whether they are engaged in the research and academic institutions, nationalized industries, or in the private sector;
3. Making information, the international resource, available to researchers, policy makers, planners and managers for ultimate goal of economic and social betterment.

Basic Services :

BANSDOC offered from its establishment on information service, document procurement service, photocopying service and translation service, bibliography compilation service. These services, which are provided on request and are charged for at nominal rates, are fully utilized by research organizations, universities, industries, Government Departments and Scientific Workers. For foreign

procurement, BANSDOC has established contacts with important agencies abroad. Payments are made in Unesco dollar coupons. The number of requests for BANSDOC services from the users both from inland and foreign countries are constantly on the increase. Slides are also being prepared for seminars, symposiums and conferences for the speakers.

Development of BANSDOC :

The Government of the People's Republic of Bangladesh requested Unesco for assistance under the participation programme 1973-74 to support the development of the Bangladesh National Scientific and Technical Documentation Centre (BANSDOC). The Unesco, approved the request of the Bangladesh Government, and Dr. Ahmed Abdel Hamed Kabesh (Egypt) was sent as an Unesco Expert in Bangladesh which took place from 28 December 1974 to 27 January 1975. [29]

Dr. Kabesh submitted the report which included a series of recommendations for the development of BANSDOC, based on the NATIS objectives, the report recommends that the Bangladesh Govt. should define a national policy for scientific and technical information, create a body charged with the responsibility of directing national activities in the field and make BANSDOC the technical Secretariat and

primary operational machinery for implementing the policy. To carry out this task he suggested that BANSDOC should be provided with suitable premises and sufficient funds. [30]

Regarding the staff, the centre should develop and support programmes of education and training for information manpower as well as information users, the Government of Bangladesh has already taken action, resulted in construction of a new building comprising 2500 square feet is coming up. New staff is being recruited and trained in BANSDOC and abroad. It is also mentioned here that the Government of Bangladesh approved a development scheme of BANSDOC costing a sum of Taka 16.2 million, as soon as the plan was fully implemented BANSDOC would be in a position to cater to the needs of scientific and technological research workers more comprehensively. [31]

The National Science Library :

A Science Library which would be able to support its documentation activities and also help it in fulfilling its national and international obligations. Recently a comprehensive plan has been prepared by the National Commission on Science and Technology of Bangladesh and steps have already been taken establishing the National Science

Library initially under the control of NCST. This library would have a co-operative acquisition programme, with the material relevant to the various national research laboratories located in the laboratories themselves but integrated through a National Union Catalogue centrally situated. Another function of the science library to survey the holdings of scientific agencies/organizations existing in the country and supplement the lacunae in their collections. The Science Library would act as the focus for the acquisition, organization, storage and dissemination of published literature in the field of science and technology.

It has been seen from a report of Dr. Peter Lazar [32] that the National Science Library in India is controlled by the INSDOC and as such INSDOC has been gradually building up its collection of scientific publications. But in case of Bangladesh National Science Library has been put under the S & T Division of the National Commission on Science and Technology.

BARC : (Bangladesh Agricultural Research Council)

Bangladesh Agricultural Research Council (BARC) established in 1973 by President's order No.32 with the twin objectives of accelerating the agricultural research

system through co-ordinating the research programmes of the various research institutes of the country as well as to develop scientific manpower for those institutes in accomplishing quality research to solve the nation's problems in Agriculture sector. There are at present the following Agricultural Research Institute/ Agencies are engaged in research activities: [33]

- 1) Bangladesh Agricultural Research Institute(BARI).
- 2) Bangladesh Rice Research Institute(BRRI).
- 3) Bangladesh Jute Research Institute (BJRI).
- 4) Bangladesh Tea Research Institute (BTRI).
- 5) Bangladesh Sugarcane Research Institute (BSRI).
- 6) Institute of Nuclear Agriculture (INA).
- 7) Bangladesh Agricultural University.
- 8) Forest Research Institute, Chittagong.
- 9) Fisheries Research Institute.
- 10) Food Technology Division, BCSIR.
- 11) Veterinary Research Institute.
- 12) Irradiation and Post Control Research Institute.

Research activities of these institutions are published in the following journals: [34]

1. Bangladesh Horticulture from the Bangladesh Agricultural University.

2. Bangladesh Journal of Agricultural Research published by the (BARI).
3. Bangladesh Journal of Agriculture published by (BARC) Dhaka.
4. Bangladesh Journal of Biological Science, published by the Bangladesh Society for Biological Sciences, Institute of Nutrition, University of Dhaka.
5. Bangladesh Journal of Jute and Fibre Research published by Bangladesh Jute Research Institute (BJRI).
6. Bangladesh Sugar Journal published by the Bangladesh Sugar Mills Corporation, Dhaka.
7. Tea Journal of Bangladesh published by the Bangladesh Tea Research Institute (BTRI).
8. Nuclear Science and Applications Series - A Agriculture and Life Sciences(Annual) published by the Atomic Energy Centre, Dhaka.
9. Bangladesh Journal of Sugarcane (Annual) published by the Sugarcane Research Institute, Ishurdi, Pabna.
10. Bangladesh Journal of Botany published by the Bangladesh Botanical Society, Deptt. of Botany, University of Dhaka.

Step has been taken to publish Bangladesh Agricultural Sciences Abstracts (1961-63), 1974 and its subsequent issues

in 1976 by the Old Boy's Association of the Agricultural University with financial assistance from the Bangladesh Agricultural Research Council (BARC).

Bangladesh Agricultural Research Council has a Library and Documentation Centre in its headquarter at Dhaka to facilitate the agricultural scientists, research administrators and planners of the country with necessary scientific and technical information. The major function of this Library and Documentation Centre is to collect, analyse, retrieve and disseminate information on all fields of agricultural sciences and technology. For the development of this centre the BARC has taken the initiative in 1980 for establishing this centre as the National Agricultural Library and Documentation Centre (NALDOC) with the following objectives: [35]

1. To act as resource centre at the national level for agricultural information communication network system.
2. To act as legal depository of the agricultural literature published within the country.
3. To build up a strong collection of agricultural literature from within and outside the country in order to meet the reference needs of the agricultural

researchers, teachers and students, and administrators, planners and policy makers and extension workers.

4. To establish reprographic services from material available within the library or the periphery and from outside the country.

5. To compile national bibliography of agricultural literature published in Bangladesh.

6. To act as clearing house for exchange of agricultural library resources material at the national as well as international level. However, the project was prepared for 5 years from 1980 to 1985 at a total cost of Taka 1.49,000/-.

Almost all the Institutes /Organizations engaged in agricultural research including Forestry, Fisheries and livestock have their own library but most libraries do not have adequate provision for procurement of current journals which is a prime need for research organizations. As the plan has been worked out developing Bangladesh Agricultural Research Council Library into National Agricultural Library and Documentation Centre (NALDOC) which would be able to survey the holdings of the Agricultural Research Institutes/ Organizations existing in the country and supplement the

lacuna in their collections. The NALDOC would act as the focus for the acquisition, organization, storage and dissemination of published literature in the field of agricultural science and technology. Bangladesh Agricultural Research Council has been designated as National AGRIS Centre from May 1977. NALDOC is regularly sending input data to AGRIS data base through AIBA*. The BARC also has been contributing information sheets to the CARIS and information have already been included in the CARIS Directories. BARC has published the Directory of Agricultural Scientists in Bangladesh in 1976 which listed 779 professionals in agricultural research. The revised and enlarged edition of the directory was ready and would come out shortly. Besides, the Directory of Agricultural Research: Finance, Manpower and physical facilities was published in 1978. [36] The BARC also contributes various articles to AGRIASIA published by IBA of Philippine.

Apart from these, the Documentation Centre of BARC presently providing the following information services for the users:

1. Current Awareness Service;
2. Bibliography Compilation Service;

* AIBA = Agricultural Information Bank for Asia

3. Document Reproduction Service;
4. Translation Service;
5. Computer service is being introduced in the BARC for data processing. The information activities can be put into the computer operation for efficient storage and retrieval.

It is hoped that in course of time BARC will become an important documentation and information centre of Bangladesh.

Health Sciences :

" Health for all by 2000 A.D." is the national objective of Bangladesh. The National Medical Library and Documentation Centre, under the supervision of the Director General of Health Services, Government of Bangladesh plays a vital role in the field of health information and documentation services. This national centre provides information services to the Health sciences and related professionals who are directly or indirectly engaged bio-medical teaching and health-care research activities in Bangladesh.

In Bangladesh there are 10 medical colleges located in different districts of Bangladesh, 6 post-graduate medical institutes : 1) Institute of Post-Graduate Medicine

and Research (2) Institute of Diseases of the Chest and Heart. (3) Rehabilitation Institute and Hospital for the Disabled. (4) I.C.V.D. (5) Institute of Ophthalmology (6) NIPSOM.

Besides, there are National Institute of Preventive Medicine, Institute of Diabetic Research, Cancer Research Institute Pharmacy Council ,Ayurvedic Systems of Medicine,etc.

All the above mentioned Medical Colleges and Institutes having their own libraries with good collections are not maintaining good linkage in the system of disseminating science and technological information in Health services.

The National Medical Library and Documentation Centre came into being in 1974 [37] to meet the comprehensive information needs of the health scientists , after recognition of medical literary potentials for educational research and health services by the Government of Bangladesh with the help of the Asia Foundation that assessed the extent of damage caused on the medical institutions during the war of liberation of Bangladesh in 1971.

It may be mentioned here that the Government of Bangladesh had set up an Enquiry Committee for assessment of the loss of life and property for the period of liberation

movement. A preliminary estimate which appeared in the Bangladesh Observer on March 10, 1972 shows that out of total of 34,137 educational institutions, 3457 have been either partially or totally damaged involving an estimated loss of Taka three crores and sixty-six lacs (Rs.3,66,00,000).

[38]

The National Medical Library and Documentation Centre of Bangladesh is responsible for the following functions and responsibilities: [39]

1. The library keeps contacts with the patrons as individuals, and as members of groups in order to be aware of their information needs.
2. It is responsible for preparing a National Bibliography of the indigenous health science and related publications.
3. It is also responsible for preparing a union catalogue of biomedical information resource material available in the medical libraries all over the country.
4. It is the resource centre at the national level and the national focal point for biomedical information communication network system.
5. This library provides leadership within the library components of the national health science

information system, and participates in the planning and over all development of the system, such as :

- (a) Educational and training of the library manpower to improve their professional competence.
- (b) Technical advices to the libraries in matters relating to organization, retrieval and dissemination of information.

6. This library maintains liaison with the other national medical libraries of the world particularly National Library of Medicine USA, British Library Lending Division, UK and WHO Central Library (Switzerland) and the National Medical Library of India.

The National Medical Library and Documentation Centre has a holding of 10,000 books and 20,000 periodicals and presently subscribing 280 current serials on health sciences from foreign countries including India and besides, 35 titles on biomedical and related journals published from Bangladesh as well as 71 medical motion pictures (16 mm films) and 17 titles film strips, 22 tapes and a large number of slides are presently available for

health services from this National Medical Library and Documentation Centre in Bangladesh. [40]

In the new concept of the National Medical Library as mentioned above the existing medical/health libraries all over the country are to be linked into a service network, Union Catalogue will be very important instruments to give shape and substance to the concept of a Network.

Patents :

Patents, as one type of documents, carry a lot of pertinent information, relating to new inventions of, or improvements to, products and processes. There is one area of activity that has been of critical concern to the state for several hundred years, and which has produced an extensive and unique form of scientific and technological literature. This area is the field of inventions and it becomes the obligation of the state to provide the protection of the rights of inventors. It has been observed that the earliest law and regulation for the grant of patents of invention was a decree of the Venetian Senate in 1474. However, it has been noticed that Venice had been making patent grants as early as 1416. The oldest system with a continuous history to the present day is the British, which for practical purposes may be

said to start from the statute of Monopolies of 1623. Patents as a form of scientific and technological literature were born when the Patent Law Amendment Act of 1852 directed that all patents subsequently granted should be printed. [41]

Essentially, a patent is a bargain struck between the state and the inventor. The state guarantees to the inventor the sole right for a certain period of years to make, use, or sell his invention, in order that he may reap a fair reward for his labours and to encourage him to further efforts. In return for its protection, the state obtains the invention first of all at the market price, and then, after the expiry of the guarantee period, quite freely. More importantly for our purposes, the state obtains a detailed disclosure of the invention in the form of the patent specification — a basic and unique primary source of scientific and technological information, including over the years the first unveiling of Whittle's jet engine, Baird's television, Marconi's Wireless, Dunlop's Pneumatic tyre, etc. [42]

Patents are entirely different forms of primary sources of information. A patent can be looked at from various angles. So far as information content is concerned, each patent presents a detailed account of a new

manufacturing process, or improvement of an existing process, a new products a new method of testing and control, etc., which may not be available in this form in other sources. Moreover, this information is presented in a particular form. Thus at times the required information could be obtained only from a patent. In the field of Chemistry, Chemical technology, pharmaceuticals, etc., patents are important sources of information. At times, depending on the level of search and the nature of the required information, a patent may prove to be the only source of a particular type of information. [43] The word 'Patent' means open, and is an abbreviated way of referring to royal letters patent : i.e., open (not sealed) letters addressed by the sovereign to all subjects, announcing the grant of some privilege. In the case of patents of invention (there are of course other kinds of patents) this privilege is a temporary monopoly granted to the inventor. All major countries (with or without sovereigns) have some such system, many of them based to some extent on the UK model.

The Value of Patents:

It cannot be denied that patents are probably the most neglected of primary sources of scientific and technological information. In ACSP survey of the information

needs of over three thousand physicists and chemists patents scored lowest of all as useful sources of information. Even mechanical engineers, as surveyed in 1967, make surprisingly little use of them. Over two thirds of the 2072 respondents hardly ever used them, and less than 6 percent claimed to use once a month or more frequently. And yet patents are perhaps the most up-to-date form of technical literature in existence, the prime record of the progress of industry. Much of the information is not available elsewhere, and for many technologies, especially chemical, almost the whole of the very latest information is contained in patent specifications. They are of value to academic scientists also, for many contain extensive discussion of the theoretical basis of the invention and concise accounts of the 'state-of-the-art'. Mellon tells that 'studies of chemical literature are not complete without a search of patents'. In the USA 60,000 patents are published annually, whereas 40,000 in UK. [44]

Information from the relevant ones out of the vast store of over 16 million patent documents in the world, accumulated over the last century and a half, can help to conserve expensive R & D resources in terms of skilled manpower, time, materials, equipments and instruments deployed in furthering R & D to develop new products

and processes or to improve existing ones. Secretary General of INPADOC (International Patent Documentation Centre) the US Department of Commerce made a study and found that 30% of the new inventions that came up for patenting had already been patented even before the projects had started. This meant that about 1/3 of the total industry-oriented R & D funds had gone out of the window. According to Prof.G.Bhattacharyya more than 400,000 specification, inventors, certificates and patents and about 500,000 applications for patents are published annually all over the world. It is obvious that centralized processing of data obtained as decentralised input from various sources and automatic processing using computer and micrographic technology is the only way to effectively exploit this vast repository of technical information to enhance the efficiency of industrial R & D. [45]

Patent Office in Bangladesh:

The Patent Office of Bangladesh granted Patents under the Patents & Designs act are operative in Bangladesh only. The Patent Office is in charge of the Controller of Patents & Design, Government of Bangladesh. The granting of patents in Bangladesh is governed by the

Patents & Design Act, 1911, Patents & Designs Rules, 1933 and Secret Patent Rules of 1933 as amended from time to time. [46]

The object of a patent is to reward the inventor by granting him an exclusive right for the manufacture, sales and use of his patented invention for a limited period of sixteen years in Bangladesh. The Patent Office of Bangladesh have library for its own, maintaining all records of the Patents granted earlier and disseminating information services to the inventors manufacturers. But the present condition of the patent office is too poor. This library should be improved providing all the necessary requirements of the library and the patent office dealing with the scientific inventions should be controlled by the S & T Division of the National Commission of Science & Technology under the Ministry of Cabinet Affairs, Govt. of Bangladesh.

Standards:

The increasing need for information services and the new technical possibilities for handling it are stimulating international co-operation, co-ordination and promotion of compatibility among information systems. Standardization becomes increasingly important to ensure

greater effectiveness of information services in all countries and the use of information and information systems across national, regional, and institutional borders [47]

Standards are technical specifications or other documents containing a set of conditions to be fulfilled. They may be issued by companies, associations or groups, government departments, national standards organizations or regional or international standards bodies. Standards are different from regulations, guidelines or statements which provide details of the requirements for materials, components or processes [48]

Here we are actually concerned with the standard as a source of information. The importance of standards in any industrial community is well known. The standards are the best source for such information. All standards are usually listed in the standardising body's hand book or list and selected standards are also noticed and reviewed in technical journals. Standards are also noticed in national and subject bibliographies. The information content of standards varies according to the nature of them. Some standards prescribe only the accepted quality or performance value of products eg., fountain pen ink, electric cables, laboratory wares. There are

standards which are on, measures and dimensions e.g., dimensions of a unit rack (for Library stack). Similarly there are standards on test methods, weight, mass practices and on technical terminology. The information content will naturally vary in all these standards. [49]

Bangladesh Standards Institutions:(BDSI)

The Pakistan Standards Institution, Dhaka was a Branch Office of the erstwhile Pakistan Standard Institution which was established in 1951 [50] in Karachi. After the liberation the Dhaka Branch Office was upgraded to the present Bangladesh Standards Institution. BDSI has finalized 200 standards since independence of Bangladesh and another 400 standards prepared by the erstwhile Pakistan Standards Institution were adopted as Bangladesh Standards.. The 600 standards (specification for products, methods of test, codes of practices) are available for implementation in trade and commerce, manufacturing industries etc.

Standards are considered vehicles for transfer of technology either from developed to developing countries or within a country from indigenous sources to indigenous

receivers. The developed countries are always resourceful for scientific and technological development in all spheres of human activities, but it is lacking in developing countries and to develop a country the best and quickest way is the transfer of appropriate knowledge of science and technology from the developed countries to developing countries by suitable means that is by Information & Documentation Services.

Bangladesh Standards Institution (BDSI) is a member of the ISO (International Organisation for Standardization) which is the specialized international agency for standardization, comprising the national standards bodies of 87 countries. The object of ISO is to promote the development of standards in the world with a view to facilitating international exchange of goods and services, and to develop mutual co-operation in the sphere of intellectual, scientific, technological and economic activity.

Bangladesh Standards Institution (BSI) has a Library of its own at its Headquarter in Dhaka. The Library receives and maintains the copies of ISO standards and National Standards of the 87 member countries of ISO. The total number of about 4500 ISO Standards and IEC standards are available in this library. [51] Besides,

a large number totalling about 6,000 BSS (British) Standards are available in the Library in addition to one set each of SAA (Australia) ,JIS (Japan) ANS (America) etc. are available as a reference service. [52] Apart from these, there are about 500 national standards of BDSI are being kept in this library. This library possesses more than 300 technical reference books and a large number of national and international standards, journals, bulletins received from other foreign standards bodies. [53]

The specifications, books and journals act as a source of information not only for the Divisional Council members, Sectional Committee members of BDSI but also for others e.g. sustaining members of BDSI. Officials of Govt. Departments, autonomous bodies, technical organizations, export-import Bureau and Private bodies. It has been noticed that from January to December, 1979 more than 1000 readers visited this library for information. [54] BDSI also publishes its official half yearly bulletin 'Bangladesh Standards Bulletin'.

Matrication Programme:

The year 1981 is the red-lettered year in the history of the country and the institution as in this year

Standards of Weights and Measures Ordinance, 1981 was promulgated by the Govt. paving the way for introduction of metric/international system of weights and measures in the country. This ordinance and the Bangladesh Standards Institution Ordinance, 1977 placed heavy responsibility on the shoulders of this institution. [55]

It is worth mentioning here that the Bangladesh Standards Institution has been placed under the Science and Technology Division, Ministry of Cabinet Affairs, President Secretariat in 1980 to link the Institution with the development of Science and Technology. [56]

Technical Information for Industries:

There has been a considerable progress of research activities in the applied fields. The industrial research organizations for special fields have started providing information and documentation services. Organizations such as Chemical Industries Corporation, Sugar & Food Industries Corporation, Steel & Engg. Corporation, Institutions like Management Development Centre, Sugarcane Research Institute, Cement Companies, etc. have all started providing this services. The public sector industries such as fertilizers, steel, oil and gas, machine tools industries are providing documentation services in their special fields. Except

these, technical information services are also offered by the various technical Institutions and by the national laboratories to various industries, the Small Scale Industries are also providing documentation and information services. All these organizations/institutes utilize the services of BANSDOC to supplement their resources.

National Science Information Policy:

However, scientific communities and national government are becoming more and more cognisant of the pervasive role which scientific and technical information plays in social and economic development of a nation. Scientific and technical information is beginning to be regarded as a vital national resource. But it has been noticed that though Science and Technology has been given topmost priority or importance in national development processes in Bangladesh which is evidenced in the establishment of National Council of Science and Technology (NCST) in Bangladesh in 1979 for preparation research plans and programmes and national science and Technology Policy. But what should be the National Science Information Policy, for Bangladesh was not included in the NCST plans..

In developing countries, governments have a major responsibility for providing information services to achieve a truly national information system, government shall have to formulate a general information policy to which all organizations participating in these activities can subscribe. In Bangladesh, information and Documentation facilities are being built up at various levels by major science organizations and thus it becomes necessary on the part of the government to work towards incorporation of a general information policy " Information policy is a major component of policy for Science and Technology. Just as Science policy must be an integral part of overall government policy, linked to social and economic affairs, information policy must seek to assure that the world's specialized and professional knowledge is fully and properly used in guiding social evolution. [57]

Industrialized countries, notwithstanding their characteristics features of decentralized economy autonomous institutions and private sector are increasingly recognizing the necessity for network planning. Developing countries on the other hand hope to improve their indigenous capability and realizing that information activities should be developed through network planning. In the field of information activities, the international organizations have also sensitized many countries to restructure

their organization of information services.

During the last 15 years, library networks have sprung up in a large number in the United States of America. Libraries and information centres are keen to discuss formal ways of linking up and interconnecting themselves. The Library of Congress assumed Leadership role in creating a National Information network in the U.S.A.

In USSR and other socialist countries, coordinated national information system has been in existence for a long time. The state accepts the coordinated information systems as a pre-requisite for socio-economic development and provides a mechanism including mandatory regulations for a well laid-out information systems [58]

In UK, now there is a single organization called the British Library with a specific mandate assigned to it to act as national library for UK. In essential feature of the present British model is partnership and mutual interdependence for the library resources.

Information systems/networks are also being developed in Australia, as the government of Australia having realized that information networks is the key

of the nation for the socio-economic development. It is observed that in Australia, initially the National Library did not consciously make extensive provision for science and technology in order to avoid overlap with the library and information services of the Commonwealth Scientific and Industrial Research Organization (CSIRO) which maintains an extensive range of library information services in the various research establishment throughout Australia. There was extensive support for the information system with the approval of the Prime Minister and the Scientific and Technological Information Services Enquiry Committee (STISEC). STISEC reported in May 1973 and recommended the establishment of a Scientific and technical information authority and adoption of a national information policy. [59]

Canada established a Central Institute for scientific and technical information in 1974, is a landmark in Canada for national planning of library and information services. [60] Mention may also be made of the Swedish LIBRIS (National Library Information System) network is is a typical example of automated network. Japan is forging ahead to develop its national information systems. The Japan Information Centre of Science and Technology (JICST) was founded in August 1957 as a non-profit making organization. Japan's budget for the JICST was ¥125,395,000

in the first fiscal year 1957-58 which was expanded to \$ 1,373,755,000 in 1969-70. [61] The Federal Republic of Germany has launched the unifying Bundesforder ungsprogram for its national documentation while France has also worked out a detailed plan for developing its national information system.

A detailed discussion about the information network of the U S A, U K, U S S R and India have been laid down in this thesis in the third chapter. It has been noticed that to day world trend is towards the development of Information Network for resource sharing wheather it be an industrialized country or a developing country.

Bangladesh being a developing country, having a large number of libraries, special libraries, documentation and information centre is lagging behind for the development of network systems for the loosely coordinated system prevailed in the country. In Bangladesh with a developing economy, scientific and technological activities are widely dispersed. A variety of documentation and information centres, with differing functions, scope and efficiency are taking shape in scientific institutions, government departments industrial establishments, business firms etc. In a stage of development, they spring up piecemeal, without coordination in a somewhat unorganized condition.

However, they function also towards supporting socio-economic objectives, which are national scope. The impetus for information network arises out of economic and time pressures which force organizations to share rather than duplicate information resources. And as such some form of overall organization is needed to direct and coordinate the activities of many separate efforts. Some method and technique should be established to coordinate the libraries and documentation centres, so that the national collection is shared by all. Information processing should be coordinated in order to eliminate unnecessary duplication of effort. The system must be organized to assure everyone access to information. And for the establishment a national Information network in Bangladesh, a proposal has been given in the fourth chapter of this thesis which will be prerequisite for the development of Information System for Science and Technology in Bangladesh in immediate future.

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CHAPTER II

GENESIS AND SCOPE OF DOCUMENTATION

NEED FOR DOCUMENTATION

CHAPTER II

GENESIS AND SCOPE OF DOCUMENTATION

General :

" Books are one social mechanism for preserving racial memory and the library one social apparatus for transferring this to the consciousness of living individuals", said Pierce Butley. [1] With the progress of civilization and advancement of science and technology, the literary world became so vast that the traditional library techniques could not cope with the bibliographical control of the ever growing volumes of scientific and technical literature which forced the research workers to invent new devices and techniques to control such accumulation of knowledge, resulted in the form of abstracting and indexing services and it required to be denoted by a new name "documentation".

The genesis of the term documentation though cannot be precisely dated but its use as a technical term is not far to seek. It is as old as the practice of librarianship itself. The term documentation came into being with new techniques and devices in the hands of researchers to keep pace with the bibliographical problems

which was over looked by the lethargy of the library profession at the early age though its origin is in the field premises of librarianship. Dr Jesse H Shera in his book Documentation and Organization of Knowledge emphasizes that " documentation develops from librarianship, which has some aspects that are qualitatively new." [2] Though vagueness is prevailing with this term, "documentation" has been defined by various library scientists in various ways. The concept of documentatin has also been changing over the years. More and more researchers have been suggesting new definitions but the wiser is to enumerate the activities and services of documentation than to define it.

Documentation and Bibliography :

We have to look back to the year as to see when the rudimentary principles were applied to organizing the recorded materials. The term documentation from the very beginning coincided with the subject Bibliography and the Bibliography was the core of library profession. The progenetors of the modern public library movement saw the problems of improving the techniques of bibliographic organization as central to the practice of librarianship. Thus Bibliography as an essential aid to

the book acquisition activities, libraries have to depend more on it. According to ASLIB, documentation is recording, organization and dissemination of specialized knowledge. Documentation list is the sources of specialised knowledge which serves mostly the specialist reader while a bibliography is concerned mostly for the generalist reader.

Dr S R Ranganathan as editor of Documentation and its Facets, said that the documentation list as being a new name for bibliography with emphasis on the inclusion of micro documents and on the reader served being a specialist engaged in research, business, deliberation or administration. Thus it is the subject bibliography which is the early manifestation of documentation and in the early stage, there was no novelty about documentation as a discipline and one cannot be distinguishable from the other (librarianship and documentation). It is noticed that in the second century Galen compiled a bibliography of his writings which was in classified sequence. The Ecclesiastical history of Britain was written in AD 731 acquiring 40 books in the list which was also arranged in classified sequence. [3]

Post-Printing Era :

Before the invention of printing there was bio-bibliographies of Christian churchmen the Catalogue

Scriptorium Ecclesiae or John Boston of Bury in which the collected books from the monastery libraries and other ecclesiastical houses in England. It was like a Union List of books which was made from 195 libraries and the list was being arranged alphabetically by author followed by a partial classification of writers under the several books of the Bible about which they had written. [4]

In this primitive stage, the library was a simple store-house of books and manuscripts, where literacy was very low in every country. The number of scholars seeking the use of libraries was lower. The readers were mostly non-scholars and the number of books published was relatively small. This was the situation of the post-printing era. After the invention of printing press the above mentioned situation changed considerably with the change of society and culture. A tremendous increase in the accumulation of graphic records which required organization in the libraries and resulted the rough subject arrangement of books. Documentation thus has its roots deep in librarianship at the end of the 15th century. This time it was Johann Trithem and half a century later Konrad Gesner by preparing their bibliographies which were said to be the first attempt at a universal bibliography. Johann Trithem compiled Liber de Scriptoribus Ecclesiasticis and his Catalogue Illustrum Virorum Germaniae and

Bibliotheca Universalis was prepared by Konrad Gesner, which was a folio of thirteen hundred pages with annotations and comprising twelve thousand titles, being all the books in Latin, Greek and Hebrew in nature, and were arranged in alphabetical sequence under authors' names. But after three years it was followed by the Pandectarum Sive Partitionum Universalium in which titles were rearranged following twenty major classes except medicine and theology. [5]

Thus the works of Trithem and Konrad Gesner were followed by a great proliferation of subject bibliographies and catalogues of particular library collections and this subject bibliography was the early manifestation of documentation. By the end of the sixteenth century it was found that the recorded materials was so vast that scholars/researchers felt the necessity for "systematization of these bulk of literature." Thus the growth in the literature of human experience and the multiplication of libraries brought with it an increasing refinement of the techniques of library and bibliographic organization. [6]

In the early stage of this profession, librarianship and documentation was inseparable from each other, where documentation was manifested in subject bibliography. But after the introduction of the printing press, the

growth of recorded materials became so large that it needed systematic arrangement. The following figures will show the rate of growth of that period to some extent.

[7]

Period (A.D.)	No. of publications
1450-1500	40,000
1501-1600	57,000
1601-1700	1250,000
1973	500,000

In another book [8] it has been found that the growing volumes of scientific periodicals tends to display the following trend (accordingly to the data of the Auger Report published by UNO-Unesco)

Early 19th century	100
1850	1000
1900	10,000
1960	100,000

If this rate of growth continues, the turn of our century will see some one million periodical published.

The growth in number can be well illustrated from a careful study of the successive editions of the World List of Scientific Periodicals wherefrom it will be seen that the increase in the number of scientific periodicals was over 108 percent during the twenty-nine years ending in 1952. The total number of periodicals covered from 1900 to 1921 was 25,000 and was 36,000 in the 2nd edition 1933; it was 50,000 in 3rd edition covering the period upto 1950; and it had increased to 59,961 by 1960 when the 4th edition came out, while it has become 70,000 in 1968. [9]

Importance of Periodicals:

The growing importance of the periodical as a medium of publication possess a significant role in the history of documentation. A journal contains multi-topical articles which are very important for the current information for the use of scholars. An articles in a periodical is known as micro-document. So necessary techniques and devices are required to have control of these articles, otherwise these material being fugitive in nature may be lost. Besides, there are 80 different written languages in the world in which articles in periodicals are published regularly.

Professor P N Kaula in an article puts Unesco's figure which is stated below. [10]

* Assuming that 1,00,000 periodicals fall into the category of learned periodicals : and if on an average each periodical has got monthly issue, we get 12,00,000 articles published in more than 80 languages in a year*. The publication of periodicals in various subjects is also increasing which has caused the phenomenon called " Information Explosion" or even " Information Deluge". The documents got doubled within a span of 7 to 10 years. This is a fantastic figure . Besides, as estimated by the Soviet Academician Dubinin, the number of scientific publications become doubles every 10 to 15 years. According to the data of the American Professor Kent, about two thousands books, newspapers, reports and other documents are turned out every minute of the twenty four hours of a day all over the world, and the approximate volume of these publications runs into some 1050 million pages. [11]

Emphasis on Content access:

It has been noticed that in the beginning of the present century two important developments occurred which necessitated some changes in the method of dissemination of

knowledge. One such development has been made in the bibliographical world, i.e. world of documents. The other has been in the scholarly world, i.e. the field of scientific research. Shift in emphasis from books to periodicals occurred and by 1850 this emphasis had been felt by the research workers. At the same time the library techniques which were developed for the treatment of books were also applied to the periodicals but the researchers were not satisfied by this treatment. On the contrary they required articles in a periodical to be treated distinctly. At this time the library profession did not turn to the needs of the research worker. " Thus an important part of the bibliographic mechanism for providing content access to a large body of contemporary literature passed out of the hands of the library profession." [12] That segment of librarianship which had thus been sloughed off, was picked up and developed by the growing group of documentatists.

At the turn of 20th century the organization of bibliographical problems became more serious, but this time some of the unscientific persons in the library profession who advocated by saying that normal indexing of literature by mere alphabets would be quite appropriate for desired results. " The professional men did not

visualise the need of the scientists and technologists as they are concerned with the "iota of thought among the hundreds of thousands of articles" [13], and even an ordinary classification system fails to arrange such a kind of literature. By 1900 it was realised by the activities that librarianship largely abandoned an early concern with providing subject access to books. This is being experienced on the lines of development of librarianship and documentation which previously had followed a common line, began seriously to bifurcate.

Abstracting and Indexing Services:

Documentation, as a discipline distinct from librarianship has been firmly established on the Continent of Europe at the close of the nineteenth century. It was the individual research workers of the Natural Sciences who practically paved the way. In the early years of the twentieth century the social pressure caused by the growth of population and on the other hand, industrial developments with the advancement of science and technology of the world, have expanded along with the production of recorded materials also increasingly developed which forced the scientists to develop some devices and methods

in place of traditional library techniques by which all these problems relating to the better analysis of the contents of periodicals could be controlled. And the new devices called abstracting and indexing services, made available to the scientists, deserved a new treatment under "documentation". Thus the individual scientist (not librarian) being pioneer could not get much support from the national and international level, and at the same time he failed to make people realize the proper need of the documentation techniques, which were invented. The work of analysing and indexing articles of periodicals has continued to be considered as one of the most important documentation activities.

Royal Society of London:

As a result, the initiative of the individual scientist passed to the organizations or agencies at different levels. Survey reveals that some landmark agencies are too prominent. The first of these landmarks is the Royal Society of London which brought out the monumental documentation list Catalogue of Scientific Papers in nineteen volumes during the years 1851 to

1925, which is an author list of scientific articles in periodical literature of the nineteenth century. This documentation list covers the fields of Mathematics, Physical and well as Natural Sciences excluding Applied Sciences. The same society published another catalogue during 1901-1914 The International Catalogue of Scientific Literature, the object was to prepare subject index to the 20th century literature in 17 branches of sciences. But this noble attempt was not carried after 1914 due to lack of financial support. [14]

Another noteworthy attempt in the history of documentation The Concilium Bibliographicum was a work of one-man Dr. Herbert Haviland Field. His ambition was to plan documentation service in the literature of Zoology. The Concilium appeared as a bibliographic service in card form with Dewey's Decimal Classification numbers. The Concilium began in 1895 and terminated in 1930. The project was supported by the American Association for the Advancement of Sciences, the SWISS Confederation, the Zoological Station at Naples and many other sources including the personal funds of Dr. Herbert Haviland Field. This bibliography also could not continue after the death of the founder as well as for the non-continuation of the financial support. [15]

The best known of all the organizations and agencies that have contributed to and the encouragement of the work of documentation is the establishment of the International Federation for Documentation.

Paul Otlet and La Fontaine :

Documentation may be said to have begun on the Continent of Europe at the close of the nineteenth century. Henri La Fontaine and Paul Otlet laid the foundation of an international movement for world documentation at their historic meeting at Otlet's house in the rue de Florence, Brussels in 1892. From the meeting of these two gentlemen came a series of important events that shaped the progress of documentation for more than a generation. The organization which they founded as the International Institute of Bibliography was established with partial support from the Belgian government. [16]

Paul Otlet and his co-founder Henri La Fontaine were concerned with everything which they conceived and were universal in character which gave the initial impression that documentation activities should be at the international level. And it is clear from the activities that they

planned universal international bibliography and held the first International Conference on Bibliography in 1895.

Change the name of Brussels Institute:

In the year 1924, the character of the Institute was changed from an International Association of individual scholars to a federation of National groups and in 1931 the name of the Brussels Institute was changed from the International Institute of Bibliography to the International Institute of Documentation (Institute Internationale de Documentation). In 1934 Paul Otlet published his famous monumental work the Traite de Documentation. This famous work of Otlet contained the concept of documentation which reads as follows : [17]

" a process by which are brought together, classified and distributed all documents of all kinds of all the areas of human activity".

Traite de Documentation is now regarded as a classic discussion of the subject. The organization was aided by the Royal Dutch Oil Company, the Rockefeller

Foundation and by contributions from its affiliated organizations in those early days. In 1937 again and finally the name of the institute underwent change and this time it was renamed as the International Federation for Documentation (FID) with its headquarter at the Hague.

From time to time many valuable publications were published from this institute. The Index de L'ingenieur et revue de La presse technique this title was changed afterwards to Meddelingen van het Nederlandsche Institute Vor Documentatie en Registruur which was started in 1903 as a most extensive engineering bibliography. [18]

Publications :

Another publication, the Bulletin of the International Institute of Bibliography was started from the beginning i.e. from 1895 and continued upto 1914 with third fascicule of the seventeenth volume and again resumed publication from 1930 under the changed title Documentation Universalis. It was also continued till 1932, but again this title was replaced by the I.I.D. Communications in 1934 which subsequently became the

Revue de La Documentation in 1947. [19]

Use of UDC :

The British Society for International Bibliography was founded in 1927 as the British National section of the Institute of Bibliography. This society was concerned in developing the Universal Decimal Classification to keep pace with growing knowledge; promotes co-operation between existing information services and assists its members in the organization of their libraries and the use of the Universal Decimal Classification for the arrangement of subject indexes and bibliographies. The UDC based on Dewey's classification, gives greater opportunities for classifying in detail. Characteristically, the UDC has had most success in special libraries and for UDC the institute maintains the International Commission of the Universal Decimal classification and selected Donker Duyvis as its first indefatigable honorary secretary. [20]

It was to provide access to recorded knowledge in two ways : by author; and secondly by subject, taking the form of two separate repertories or catalogues.

arranged authorwise and also in classified sequence through the UDC. It was seen later on that the number and arrangement of repertories comprising the Universal Bibliography Repertory varied but the basic modes of access to it were maintained. The International Institute of Bibliography held conferences in 1895, 1897, 1900 and 1908. [21]

Dr J H Shera in one of his articles [22] said that Paul Otlet and his friend Henri La Fontaine did not even realize how deeply their roots would run, nor the magnitude of the movement which despite all its subsequent vicissitudes they had realized. However, they had taken help from the library techniques to organize and index the recorded knowledge they had meanwhile collected and also choose the Dewey Decimal System as a basic foundation of classification, but they were striving for comprehensiveness along with more penetrating subject analysis of bibliographical materials than that of conventional libraries. * It might be presumed that they also tried to give a new name of the activity to make it different from that of the librarian and therefore, called it "documentation". Thus was begun a schism within librarianship, the end of which has not yet been reached". [23]

International Catalogues :

Almost simultaneously with the work of Otlet and his friend La Fontaine the Royal Society of London, began to take initiative in systematic arrangement of scientific and technical literature. Joseph Henry of the Smithsonian Institution in his address in the British Association for the Advancement of Science meeting in Glasgow, 1883, stressed the proposal for a catalogue of scientific papers. And the Royal Society at its meeting in July 1896 laid the foundation for its International Catalogue of Scientific Literature. [24]

Besides, there were some other organizations to gear up bibliographic activities such as the International Committee on Intellectual Co-operation between 1925 and 1946 which was sponsored by the League of Nations for the study of bibliographic problems by specialists in their respective fields and aided for the better organization of literary, artistic and scientific works. In 1925 an International Catalogue of Sources of Current Bibliographical Information Index Bibliographicus was published which was arranged and edited for the committee by Marcel Godet, Director of the Swiss National Library.

The French Government also gave grants-in-aid for bibliographic works including bibliographies, journals and for directories to solve the problems in their respective subjects.

IFLA :

The International Federation of Library Association (IFLA) came in service since the beginning of the year 1927. This organization from its inception organized a series of meetings for bibliographic problems. It also sponsored the publication of proceedings of those meetings as a permanent contribution to the literature of international bibliographic problems. At an International Conference of Librarians and book-lovers in Prague in 1926 a proposal to set up an international committee representatives of national library associations was accepted. This was acted upon during the (British) Library Association Conference meeting in Edinburgh in 1927, when an International Library and Bibliographical Committee was created by the representatives of associations from 15 countries. The name was changed to International Federation of Library Associations (IFLA) at the Third Annual Conference held in Stockholm in 1930.

IFLA's long term programme published in 1963 may be summarized as - " Until recently it (IFLA) was mainly a forum for librarianship in Western Europe and North America and there can be no doubt that these regions will be its stroughold for a longtime to come. Within the last three years however, 25 New Nations joined the Federation, most of them from Eastern Europe, South America, Asia, and Africa. Some are countries where library traditions have deep firm roots but where matters are viewed from a different angle".

The following achievements and projects are handle internationally by IFLA.

(1) International library loan (ILL): In 1935 regulations and a standard form for loan were agreed upon and have been progressively revised since then. Related matters such as Union Catalogues, International loan Centres, the use of talex, micro copies as substitutes for loans were all studied by the committee and thus contributing to the smooth flow of documents across national boundaries.

(2) Statistics : The increasing use of computers has made reliable statistical information more easily available. The situation for book production, libraries, films etc.

has long been confused, thus frustrating international comparison of services and costs. The IFLA on statistics and standardization has greatly contributed to the Unesco studies on methodology in this field.

(3) Cataloguing: The most ambitious undertaking by IFLA was the International Conference on Cataloguing Principles held in Paris in 1961. It was an undoubted success thanks to the thorough preparatory work involving many preliminary studies and world wide participation made possible by generous grants from the council for library Resources.

(4) International Standard Bibliographic Description (ISBD): An International Meeting of Cataloguing Experts (IMCE) was held in Copenhagen in 1969 and in this way the work on an ISBD was set into motion and final recommendation were published in 1971.

(5) Universal Bibliographical Control (UBC): It is an ambitious programme to co-ordinate wide range of ideas and plans coming out of the committees and sections of IFLA. The bibliographical information about each book should be provided as completely as possible with a minimum of delay and in machine readable form.

ASLIB :

The Association of Special Libraries and Information Bureau (ASLIB) though not international as those mentioned above, contributed greatly to the promotion of documentation far beyond its native England. The Hoddeston Conference of 1924 led them to the formation of ASLIB to consider, promote, and organize the systematic utilization of bibliographical activities. Its major contribution towards the international bibliography began mainly from 1945 when Theodore Besterman was the editor of the Journal of Documentation. It was strengthened more when British Society for International Bibliography (BSIB) was amalgamated with it in January, 1948 under the code name ASLIB, and continued the publication of the Journal of Documentation, the leading professional publication. Bill M Woods in one of his articles said that " World War II in 1941- the Need for quick and accurate information became imperative within the charge to develop and rapidly produce materials, equipment and services needed to win the war. The end of the war introduced a period of unprecedented expansion of specialized library facilities, not only in industry but also in higher education, government and professional

organizations of all types." [25]

Special Libraries in USA :

The first century of Special Librarianship which dated (approximate) 1840-1940 were described by Dr A T Kruzas in the sense that early special libraries were special subject or professional collections initially affiliated with universities. " Perhaps the most important recent event in the promotion of education for special librarianship was the conference at Princeton University in 1948 to consider the problems of professional preparation. [26]

In the United States the documentalists being separated from the American Library Association tried to form Special Library Association in 1908 under the able leadership of John Cotton Dana, [27] who after some-time approximately a year, wanted to incorporate it in the A L A at the Mackinac Island Conference. But the Executive Body of the American Library Association refused to incorporate this new association and as such the Special Libraries Association was thereafter formally incorporated as an independant organization.

ADI : American Documentation Institute

With the establishment of American Documentation Institute, the term 'documentation' was interpreted mainly as the photographic reproduction, particularly on micro-filming of rare documents. Later on their working quarters were crowded with a multiplicity of materials that deviated markedly from the traditional book format, confronted with the need for organizing special reports in manuscripts, in typed script, in photo-offset, in photostat, in microfilm and in micro-card photographs, plans, charts, diagrams and other pictorial materials which made them realise the acute necessity for more indexing and abstracting services and led them to experiment seriously with machines for the mechanical and electronic organization and sorting of these materials. [28]

Encouragement of the Govt. of USA :

The American Government has taken steps towards encouragement of documentation which resulted into the National Union Catalogue of the Library of Congress. The Bibliography of Agriculture prepared by the Agricultural Department is another example of bibliographic achievement.

Chemical Abstracts, Engineering Index by American Society of Mechanical Engineers, other abstracting services by chemical Abstracts, Inc. Population Index, Social Science Abstracts are examples of international services. The broader concept of documentation word include commercial services as those issued by the Commerce Clearing House, the McGraw-Hill Publishing Company, H W Wilson Company, which are some of the examples of the successful commercialization of bibliographic services.

In fact the organization of documentation for the use of research and administrative personnel is economically profitable to provide enterprise. This is especially true for industrial research, where the organization of private research reports is a vital problem in documentation.

Scope of Documentation:

Documentation as a discipline distinct from librarianship may be said to have begun on the continent of Europe at the close of the nineteenth century. [29] The discipline of documentation grew in professional stature and the need for its services became increasingly apparent to those engaged in pure research, in industry, in business, and in government, and as the volume of informational

literature grew in magnitude, it becomes obvious that the traditional techniques of librarianship were inadequate for these new demands.

The documentation began to explore a wide variety of new techniques for the organization and servicing of their materials.

The scope of documentation has become vast, first it was treated with a limited scope but subsequently the term documentation includes every thing in the field of library science with a national and international character and scope. The modern trend in documentation is towards the mechanization of both storage and retrieval of information through the electronic apparatus. A number of such devices like Punchcard system, SMART, Peek-a-boo, etc. are being used in the western countries whereas Computer and on-line system, satellite are the latest among all. The scientific community of the world should be kept constantly informed of the latest trend of research and development in the various fields of science and technology. It is so essential, since the lack of information concerning a particular problem can bring about a colossal wastage of time, energy and money. To this end, documentation plays a very vital

role in keeping the researchers currently, expeditiously and exhaustively informed of the nascent micro thought in the field of scientific and technological advancements. The scope of documentation being vast in character, assumed a fundamental responsibility in safeguarding, by all possible means the ultimate research potential of the world. [30]

Modern Use of the Term Documentation into Information Science/Informatics

General :

Before world wars, all friendly countries of the world were depending on each other's natural and scientific, technical resources, but this condition did not continue due to the outbreak of the two great wars, separating friendly countries each from the other and which felt them necessity of self sufficiency resulting in rapid increase in scientific and industrial research in England and other European countries. Hence the two world wars may be regarded as the major factor for the development of the present trend and pattern of Library Science.

The changing pattern of the scholarship in the

20th century is another factor for the development of documentation. The concept of documentation has been variously understood in different quarters, but no such precise definition has come out which would be acceptable to all. Jesse H Shera in one of his articles said :

" The corpus of recorded information is the very soil from which all the processes of documentation grew and that the goal of every one of these processes — bibliographies, abstracting services, indices, even classification itself is the retrieval of an individual item from among the vast number comprising this corpus of literature." [31]

Definition of Documentation:

The word ' documentation' was originally derived from the word 'document'. At first the word 'document' was used only in its legal sense, i.e. ' the written determination of rights and situations in a legally prescribed form'. Later the word 'document' came to mean a material object containing fixed information for dissemination in space and time and for use in social practice. Several documents related to each other by

their contents are often referred to as documentation, scientific documentation, technical documentation etc. [32]

It is actually difficult to define the term documentation. The definitions furnished by various authorities still seems vague and often make us confuse as to the precisely mentioning what documentation includes and what its boundary areas.

According to the Shorter Oxford English Dictionary this the meaning which has gained more or less acceptance since 1888 though the word as far back as 1754 by another meaning namely 'furnishing of a ship with paper required to manifest its ownership and cargo.' Since 1888 the term in everyday language has come to mean the preparation or use of documentary evidence and in a fiction the reliable reproduction of records real or supposed. This is also not fully cover the technical sense in which it was first used by S.C.Bradford. [33]

Late S.C.Bradford define documentation " the art of collecting, classifying and making readily accessible the records of all kinds of intellectual activity ... the process by which ... is ... put before the ~~exam~~ creative spealist the ~~existing~~ literature bearing on the subject of his investigation in order that he may be

made fully aware of previous achievements in his subject, and thus be saved from the dissipation of his genius upon work already done." [34] The Schweizer Lexicon defined 'documentation' as " the handling and organization of scholarly materials." [35] Prof. P N Kaula describes the documentation service as under:

" The persons who want to study should be kept informed with up-to-date information. The aids were a bibliography, a documentation list on a catalogue of documents. There were many documents which could not be considered books. For instance, articles in periodicals, reviews in newspapers, editorials in periodicals, chapters in books, pamphlets, monographs etc. Entire literature of his kind was going to be a waste as wholes. But the materials described above are very valuable because they give upto-date information whereas the information in book should necessarily be a year or two behind." [3]

The late Dr S R Ranganathan, the doyen of library profession in India-Bangladesh defined it as " Promotion and practice of bringing into use of nascent micro thought by specialists and pin-pointed, exhaustive and expeditious service of nascent micro thought to specialists. [37]

In my previous section, it has been said that the

technical term documentation came into use and was firmly established in 19th century, and the term documentation was well supported by the two great founders Paul Otlet and Henri La Fontain of the International Institute of Bibliography which afterwards became International Federation for Documentation in 1931. " The value of the library and its information service gained appreciation.

[38] In 1905 the Belgian Lawyer Paul Otlet used the term 'documentation' in a lecture at the international economic conference to mean the specific activity of fathering, processing, storing, retrieving and circulating documents. In a same sense the term documentation was used in 1920 in the name of NIDER (Nederlands Institute Voor Documentatie en Registratuur). [39]

However the term documentation steadily developed from the discipline librarianship and was firmly established towards the end of the twenties of the present century, accepting the term by the most of the European countries, which also become prominent in American continent resulting in the establishment of the American Documentation Institute and its official organ American Documentation. Actually the previous name of the American Documentation was the Journal of Documentary Reproduction. There was a further shift in interest towards the

mechanized handling of information when the computer was being used.

Documentation Centre Established by UNESCO:

After the second World War, a Division of Documentation, Bibliothèques et Archives (DBA) of the UNESCO was established. By the activities of this Division, further spread of the term documentation was made and consequently a number of Documentation Centres came into being in national as well international²⁴ levels with the assistance of UNESCO, e.g. INSDOC, BANSDOC, PANSDOC, NIDOC, IRANDOC, THAIDOC etc.

IR & ISR : (Documentation to Information Retrieval & Information Storage & Retrieval)

Though the term documentation was very prominent in the profession of Librarianship all over the world, but since 1950 some other term in place of documentation had been crept into this profession. It was observed first in America where the activities and interests of ADI (American Documentation Institute) were very much with microfilm and microcards as carriers of recorded

knowledge. The new term Information Retrieval (IR) was coined by Calvin Moorers in 1950 and this term was accepted by many to express more closely the American brand of Documentation activities. According to Fairthorne, Information retrieval is " the recovery from a given collection of documents, and with stated probability, of a set of documents that include ... all documents of a specified content ... " [40] Vickery defines " Retrieval is a form of communication and we may expect its analysis to be aided by other studies in the communication Sciences". [41]

In 1963 Becker and Hayes explain seven major categories of information retrieval such as : [42]

1. Human communication;
2. Communication in libraries;
3. Organization of information;
4. Equipment;
5. Intellect and cognition;
6. Numerical measurement and
7. Adaptation.

Information retrieval meant to satisfy only operations necessary to gain access to recorded knowledge

irrespective of the form of document. The term became popular in the USA which replaced the usage of the term documentation. It was commonly referred to systems and procedures for the retrieval of documents that may inform clientele or users on particular subject areas of interest to them. After the introduction and use of the term IR it was realized that retrieval of any kind had to be preceded by some kind of organized storage. Later the term IR was augmented and a slightly modified expression was introduced to the IR. This was Information storage and Retrieval (ISR). The British Journal of Information Storage and Retrieval is an example of this term used there. The new term ISR and IR were used for sometime to denote the identical concept. [43]

Speculation soon yielded to experimentation in attempts to find mechanical and electronic means for the storage and retrieval of recorded information and in the earlier stages of development, microfilm with encoded patterns of transparent and opaque dots were wedded to miniaturized text as in the Rapid Selector of Ralph Shaw or the minicard system of Eastman Kodak. [The computer-based retrieval systems started making their appearance in the 1950's. These were the first systems

to provide a true multi-access approach to subject matter. In fact ISR was distinguished with traditional librarianship as the former was thought to be carried out with sophisticated machinery like computers. This notion was synchronised with the tremendous growth in literature of the so-called "Information Explosion" which is considered, could be tackled only with the help of modern techniques mentioned above.

Mortimer Taube and Calvin Moors were heralding respectively, Coordinate Indexing and Zatocoding, which they believed could readily be adapted to any form of automated sorting technology. To all of these battles on the findings of the library techniques, the conventional librarians in this period were preoccupied with the problem of physical arrangement of volumes on shelves without paying sufficient attention to more important aspect of providing information to the prospective clientele. [45] Information retrievers and users both considered ISR synonymous with "Scientific Information" became the techniques of ISR were only applied to literature on service and technology.

The distinction made by American workers about

library activities and ISR could not stand critical examination. It was pointed out by British workers that anything retrieved in response to a query could be retrieved of information, no matter whether information has been collected from a book, gramophone record or has been flashed on VDU of a computer. Application of the term ISR to scientific and technological information was also countered as literature in arts, social science and humanities was also considered to be equally important. In spite of the above objection ISR scientific information and even documentation was continued to be used throughout USA in 1950's.

It may be mentioned here that immediately before the introduction of the term IR another term was invented but was not appreciated. This was 'Science Information'. However, in the title of a recent work we find a very prominent use of the term. The work being referred to is G.W.Hanson's Introduction to Science Information work, published in 1971. Hanson has defined this subject as, "science information work, is a form of scientific activity, depending greatly on librarianship and often includes library operations, but differing so much in view point and scope from librarianship that it cannot usefully

be regarded as a branch or development of-it". [46]

Information Science :

Another term "Information Science" was coined. It was widely accepted being sophisticated and used at the end of the same decade 1950 in the United States of America. The impact of expanding information requirements was first felt in the areas of Science and Technology. Information Science is that discipline that investigates the properties and behaviour of information, the forces governing the flow of information, and the means of processing information for optimum accessibility and usability. [47] To -day the impact is being felt throughout many and diverse areas such as education, law, medicine, and the humanities. The Federal Government is placing increasing emphasis on the importance of information as evidenced by the Weinberg report, published in 1963. [48]

This term is accepted as an inter-disciplinary science that deals with the properties and behaviour of information the study of the flow and use of information and techniques both manual and mechanical of processing

information for optional storage and dissemination. The aims and objectives of Information Science were defined in a Conference on Training Science Information specialists held at Georgia Institute of Technology, Atlanta 1961. The term documentation was explicitly rejected in the same conference because of wide variations in use and its numerous interpretations. It has been noticed in USA that from 1962 onward the term Information Science was rapidly accepted for all practical purposes as the general label for documentation, and the earlier terms IR and ISR were being used in the more restricted sense of mechanised retrieval system.

In the words of Prof. Jack Belzer [49] "with whom I come in contact has a different notion or idea of what information science is, and I have come to believe that it is all of these things, information is many things." Claude E. Shannon made some important contributions to the field of information science, he gave us a "unit of measure", which is important and necessary to every field of science. Another contribution was the idea that a message is information only if some uncertainty existed before receipt of the message. The measure of information is based on the account of uncertainty that

the message is predictable with certainty, i.e., that if the probability of this particular message being received is 1.00 (we already know what the message contains), then it provides no information". [50]

According to several writers, information science has both a theoretical side consisting of studies of what information is, and how it can be used and an applied side concerned with practical techniques for assisting users of information. The theoretical side involves disciplines like library science, psychology and linguistics. While applied side draws upon a wide variety of disciplines including mathematics, computer technology, operations research, communications and management. Information science programmes at various American institutions at advanced graduate level are computational linguistic man-machine communication, automation and switching theory, advanced numerical analysis etc.

Documentation to Information Science:

The term 'Information Science' which was first used in U S A in 1952 and widely accepted in many quarters

in 1962. In 1966, the ALA formed the Information Science and Automation Division (ISAD) to replace the original Interdivisional Committee on Documentation, and after one year the American Documentation Institute changed its name to the American Society for Information Science (ASIS) in 1968, and its official organ American Documentation which was started in 1950 was also changed into Journal of the American Society for Information Science (JASIS) in 1970. Late Dr Jesse H Shera said in 1952 that "the New Librarianship was emerging from the maturity of microfilm and pushing onward the infancy of Information Science". [51] It was claimed that "JASIS represents a growing and vital science, developing a theoretical basis and applying these theories to practice for the general good." Another important use of this new term is to be found in the title of the most comprehensive review publication of documentation viz. the "Annual Review of Information Science and Technology" published since 1966. [52]

Now the term "Information Science is in use not only in USA, it has been accepted by other countries also. Britain seems to have been affected by this newly term Information Science." The Sheffield University School of Library Science included in its course of

study ' Information Science instead of Documentation Courses.'

In another article [53] it has been seen that in UK information services in University libraries were suggested as far back as 1939, it has only been since the mid-sixties that the information functions has been seriously developed by University Libraries in UK. A study of the published literature and of annual reports of University Libraries shows some of the main developments which have taken place. Organizationally, Library based information services are provided by different types of staff in different institutions. The city, Surrey and Loughborough University Libraries have created separate information Sections, while in other technological University Libraries. Bath and Bradford for example, services are provided by subject specialist information officers.

Information services are also provided from departmental libraries for example, the Town and Regional Planning Library at Sheffield and the Library of Electronic Engineering Science at University College, Bangor, have developed information services in their subjects.

Besides, Belfast, Newcastle, Reading and Southampton University Libraries have appointed information officers in broad subject fields and similar appointments have been made by OSTI at Birmingham, Cardiff, Imperial College, Salford, Strathclyde and Sussex as part of a three year experiment to evaluate the role of information officers in promoting library resources and introducing new information services to library users. There were also experimental information officers at Durham University as part of the PEBUL Project. [54]

Emergence of Information Science :

Information Science has emerged from its archaic types of library service documentation and information storage and retrieval and from other computer and information oriented contributory disciplines. Thus information science is evidently a division of a set of communication oriented discipline. [55] Professor P N Kaula said that, "A modern information system is composed of four M's. There are men, machines, material (documents or data) and method (Procedure). We live in an age of Communication, we need information and want proper men to handle documents embodying information". [56]

Information Science in USSR :

In the Soviet Russia, they felt that the term documentation was not sufficient to include all information of the modern scientific world and in view of this another new term was coined and used there. This is 'Informatics'. Here emphasis is on the nature and growth of information rather than documents. In 1966 Prof A I Makhailov and his colleagues A I Cherny and R S Galyarevskii of the USSR published in their paper ' Informatics' the new name for the theory of scientific information. They gave emphasis on the subject matter of informatics, are the phenomena and general law of scientific information activities, rather than these activities should be done by the researchers and scientists in their respective field of science and technology. It is said by them " What is important is the fact that there is a certain piece of scientific information which is to be timely brought to its potential user in the most effective way and in a suitable and sufficiently complete form".[57]

Information Science is a discipline belonging to social science, which studies the structure and general characteristics of scientific information and also general laws governing all scientific communication.

Slowly the lines of development in librarianship, documentation and mechanized information retrieval were being inter-twined to form the warp and woof of a new tapestry that of information science or informatics. " The information which is retrieved is always physical. It is a message of some kind. But what is retrieved is ultimately determined by what is stored, namely the nature of the item that is indexed or catalogued". [58]

School of Information Science :

Information Science is now well established in post-graduate level in Great Britain and has recently been started to a graduate level also. [59] Sheffield University leading to M Sc courses in Librarianship and Information Science. The School of Librarianship and Archives at the University of London extended its interest to information science. Under graduate training is being given at Newcastle College of Commerce from 1968. And short courses upto a week in duration have been provided by Aslib (Association of Special Library and Information Bureau).

In Germany and Sweden there are several courses which cover general aspects of Information Science. There

appears to be a good course in Czechoslovakia at Charles University in Prague.

In the United States the situation is more varied and is not easily assessable one year M Sc course started at Georgia Institute of Technology from 1963. Elsewhere, separate full courses deal with mixtures of subjects e.g. computer technology, linguistics, cybernetics and system design as they relate to communication and information retrieval. Information Science therefore includes all forms of communication of which the act of reading is only a part.

There is little doubt that information processing technology will change man's condition whether for better or worse remains to be seen information technology is increasingly penetrating and altering library procedures: A considerable amount of scientific work is being performed in information science which has potential implications for library practice. [60] Librarianship has much to gain from information science.

Definitions of Information Science:

Many definitions of Information Science have been given by library scientists and experts with individual

interpretation. Wellish [61] has compared the terminology of 39 different definitions of IS published within seventies in order to find out the common concepts of this discipline. The comparison shows that no consensus exists among the practitioners^{ti} of IS about what it is or should do. No generally acceptable definition of IS has yet attained the status of a true science. The scientists are also split in their opinion whether there is an information science (singular) or information sciences (plural). Nevertheless interdisciplinary character of IS remain firmly established.

According to Harold Borko [62] " Information Science is a true discipline, that investigates the properties and behaviour of information, the forces governing the flow of information and the means of processing information for optimum accessibility and usability. It is concerned with that body of knowledge relating to the origination, collection, organization, transformation and utilization of information. This includes the investigation of information representations in both natural and artificial systems, the use of codes for efficient message transmission and the study of information processing devices, and techniques such as

computers and their programming systems. It is an interdisciplinary science derived from and related to such fields as mathematics, logic, linguistics, psychology, computer technology, operations research, the graphic arts, communications, Library Science, management and other similar fields. It has both a pure science component, which inquires into the subject without regard to its application and an applied science component, which develops services and products".

Borko has derived this definition from the three definitions given by Robert S. Taylor in his chapter as "Professional Aspects of Information Science and Technology" in the Annual Review.

According to Rees and Saracevic [63] Information Science "cannot be equated with documentation, information retrieval, librarianship or with anything else. Information Science is not souped-up information retrieval or librarianship anymore than physics is super charged engineering. In view of these two writers, Information Science is an area of study and research which draws its substance, methods and techniques from a variety of disciplines to achieve an understanding of the properties,

behaviour and flow of information. It includes systems analysis, environmental aspects of information and communication, information media and language analysis, organization of information, man-systems relationships and the like.

Taylor [64] argued in 1963 that behavioral sciences provide a fundamental approach to information science, alongwith logic and mathematics, linguistics and systems analysis.

The communications and behavioral science aspects of information science were thus becoming apparent. In general, however, the relatively few definitive views of information science offered in the early 1960's tended to be circumspect and tentative. By 1967, however, relationships between information science and the communication sciences were more clearly discovered. Weisman argued, for example, that information science is a basic and major component of communication. He viewed the communication sciences as an interdisciplinary field, not a discipline, the concern of which involve the multiple processes of communication and exchange of information by natural and artificial systems.

In 1967 Gorn [65] viewed information science

as a sharply defined discipline in its won right, rather than just another interdisciplinary area. He tentatively lebeled this discipline "cybernetics pragmatism" which in effect is a reformulation of the concept of liberal education.

One which would place the arts, sciences, humanities and professions in closer communication possible even to the point of achieving agreement in general educational aims. It is itself part of a liberal arts contribution of this new discipline, as is an understanding of what can and what cannot be mechanised.

So information science was initially defined as a discipline in 1962 and has since been criticized as a fundamental science. Its unified growth appears to be ending and fundamental branches are emerging. Information science, as well as documentation and information retrieval, have been identified as communication disciplines. Recent attempts to define information science suggest links with the modern generation of communication and behavioral sciences. By 1970's information science has achieved completeness as a disciplinary system. By 1990 it should achieve a relation state of maturity, specialization within its ranks could become intense. But

new fusion and fission, with attendant name changes, could occur within the next two decades.

From even this cursory survey of the changes that have taken and are taking place in librarianship during the past thirty years, it would seem to be apparent that however confused the situation may be at the moment, the world of the librarian is far from being static, however, the responsibility for this lies on the shoulders of librarians, information officers, information scientists — all that is who would lay claim to be specialists in the new discipline of "Information Science".

II

NEED FOR DOCUMENTATION

Introduction:

The concept 'Documentation' has been recognised in the profession of librarianship as a separate discipline when the traditional library techniques failed to cope with the tremendous increase in the volume of publications accompanied by the shift in form from the books to the periodical articles and more recently the separate research

report particularly in the field of science and technology now also including social sciences and other branches of humanities as well. To-day the researchers, scientists, technologists, and users are more concerned about the content accessibility of the macro and micro documents within the quickest possible time.

The bibliographical control of the mass production of documents in the literary world has become indispensable and as such the new devices of abstracting and indexing services have been made available with the modern apparatus of computers to tackle such exponential growth of publications embodying recorded thought which required to be denoted by a new name : documentation. Dr. Jesse H. Sera observes that " documentation develops from Librarianship; it has, some aspects that are qualitatively new, and these have caused some specialists to draw a distinction between the two professions." [66]

A document is an embodied thought, which according to Webster's Third New International Dictionary means ' to provide with factual or substantial support for statements made or a hypothesis proposed'. The term 'documentation' may have been derived from the word document. The document is used by the seekers of knowledge" when document

became an item of information which is sought by the seekers of knowledge, the activity connected with its selection, collection, processing, organization and presentation brought in the concept of Documentation." [67]

This new concept documentation has been developed steadily from the older form of Librarianship with new techniques to gear up the traditional library techniques.

" The Newer techniques made possible by the introduction of computers and the ways in which they help to make out the new role of this ancient profession : the role of documentation." [68]

Documentation as a new function has entered into the profession of librarianship and why library profession took up ' documentation' has been stated clearly by Dr.S.R. Ranganathan in his opening address of the DRTC Seminar in 1969 in which he mentioned two lines of approach to look into the past and also to look around to see what is happening to-day. [69] With regard to the past the post-printing era should be taken into account, one line of approach will be the nature of the users of library service; and the other, the nature and the rate of production of printed documents for use.

To look around i.e. what is happening to-day is the heavy impact of the population pressure and the consequent

social pressure on library services.

There was a time when a diligent scholar could literally read all recorded materials of learning. "There were periods in human history in which it was possible for the polymath or the polyhistor to be informed of the contents of much of that part of the extent record of human activity. In that early period, literates were very few : and scholars were much fewer. Further, the annual productions of books in a country was very small and the total number of books available in a library was also small." [70] But those days are no more today. With the progress of civilization and culture and growth of population and the consequent increase in demand for consumer goods of various kinds in every country have led the society to enter into the scientific and technical literary world.

Science, being the basis or foundation of civilization making rapid strides in different fields has been leading to discoveries for economic progress of the social well-being. And thus the research output which was almost negligible in previous years, has grown in prodigious proportion. The tremendous progress of science, technology and social sciences are reflected in

different graphic records.

Half a century ago literacy was very low in every country and a library was generally maintained by a scholar and sometimes assisted by a clerical assistant. The readers were very small and they were mostly non-scholar and as such their demands were also small and collection of books in the library was also small. In such a situation there was no library profession. But about the middle of the 19th century elementary education was made compulsory in some of the countries, a public library system was also slowly developing to prevent illiteracy. The practice of having a full-timed librarian instead of putting a scholar in part-time charge was taken up by the academic libraries. This led to the ablemen taking up library work leading to the emergence of library profession. This factor consequently paved the way for library science to meet the social demands.

In the past, one thousand periodicals containing approximately 20 thousand learned articles were considered sufficient for reasearch work. But today, in the different parts of the world, a huge amount of reading material is pouring in. The ever growing volumes of research publications particularly in science and technology and social

sciences are so wide and increasing day by day that it has become a great problem to the scientists and technologists of all over the world to go through the pages of all the publications. The number of periodical articles that appear every year containing subjects like Physical Science, Applied Science, Social and Political Science, Economics is so vast and overwhelming that it has become impossible to have bibliographical control by the traditional library techniques and devices.

On the other hand nascent thought in these days is embodied quite often in articles appearing in periodicals. For a scientist, learned periodicals are his essential tools. In the present day there has been a constant growth of periodicals, and in this days the cost of periodicals have also increased manifold. A telescopic rise in cost of periodicals has been shown in Appendix-D.

Effect of printing:

Dr. Ranganathan, who is regarded as the father of library movement in Indo-Bangladesh, described documentation as the new phase of library service to scholars in the seminar on the role of Documentation at Bangalore on 14 November 1963. " In the far off days, the scholars

carried their library in their mind, so too speak. There were only a few documents and fewer scholars. The scholars living near one another would occasionally meet and feed one another with their new ideas. About five centuries ago a change came. Printing with moveable metallic types was invented. This enabled production of copies of some document at a low cost. This made exchange of ideas easier without the necessary personal contact between them became faster." [71] Gradually, with the advent of printing press the increase of recorded materials became so great that the magnitude and multitude of the scientific and technical literature continued to increase at an exponential rate. The situation has further aggravated owing to an increasing emphasis on the interdisciplinary research and the natural phenomenon of scatter, seepage, multifocalness and multi-lingualness of the documents. To cope with these problems documentation service is essential.

SOCIAL Need :

The importance of documentation is significant in productivity demands in the efficient utilization of all kinds of human resources we have in plenty. Each one of us is experiencing social pressure in the form of

population pressure. " Natural resources have been distributed inadequately with respect to population concentration. But the scientific achievement made the people to convert near natural and artificial commodities into consumable commodities in order to feed, cloth , shelter and transport the teeming millions". [72]

This places a great responsibility on the scientist and technologist. Productivity demands the efficient utilization of all kinds of resources principally human resources and natural resources, which should be more efficiently utilized for tackling the social pressure. National development depends on the efficient utilization of past experience. To have new achievements, the past experience and research report should be made available to those persons at the right time who can use the information. Research itself has to be so managed that it is most productive of the greatest benefits to the society.

Scientific and Technical Need :

The present literature world is so wide and the number of publication of articles in scientific and technical journals are so increasing day by day that it

has become a great problems to the scientists and technologists of all over the world to go through all the pages of all the publications. The number of scientific journals and periodicals which was about 100 at the begining of the nineteenth century reached 1000 in 1850; more than 10,000 in 1900, approached 1,00,000 in 1960 and if the rate of growth remains constant, should be in the neighbourhood of a million at the end of the century. The American Chemical Society's Chemical Abstracts digests about 1,00, 000 papers a year from some 5,600 periodicals. Its latest 10 year index files 19 volumes of 24,000 pages with 6,40,000 entries. [73]

Research workers in different fields of study require most comprehensive and up-to-date knowledge of the latest developments as recorded in the graphic records in the form of current periodical articles, technical and scientific reports, but the traditional library techniques failed to keep pace with this mass development.

On the other hand, nascent thought in these days is embodies quite often in articles appearing in periodicals. For a scientist, learned periodicals are

his essential tools. In the present day, there has been a constant growth of periodicals. Unesco, figure puts them at 1,50,000 in which 1,00,000 periodicals fall into the learned periodicals form the media of nascent thought in the world today." If each periodical is to be taken as a monthly then there are about $100,000 \times 12 = 12,00,000$ issues of learned periodicals appearing in a year today. If we estimate that on an average a issue contain 10 articles, then there will be $12,00,000 \times 10 = 120,00,000$ articles in a year. [73A] The traditional books are counted 3,00,000 in a year and other documents 150,000 making a total of over 600,000 item. In an article written by Herbert S White ; literature growth has been shown which was projected by Georges Andela that world literature of science and technology is eight per cent per year. [74] Dale Bale Baker of the Chemical Abstracts Service reported in 1976 that chemical literature as covered by service was taking less than 10 years to double. [75] In another report it has been seen that in 1975 Chemical Abstracts included abstracts of 3,24,000 papers and books and with addition of patents the total is 4,54,000. This figure becomes twice in comparison with what was in 1965. It is estimated that it will be more than 10,00,000 per year by 1986. [76]

Another important figure has been taken here from Professor P N Kaula's article [77] in which growth of Medical Science Journals has been shown. In 1841 there were only 43 journals in Medical Science, which number became 1910 in the year 1900 and it increased so rapidly that by the year 1961 the periodicals in Medical Science rose to 5,800 as recorded in World Health Periodicals. It was also estimated that during the last 20 years the number must have doubled. Verner Clapp, the former Deputy Director of Library of Congress in his Bibliographical Organization in 1951 said that the population of U S A had doubled by 1950, the number of copies deposited under the copyright law had trebled and number of all the published documents had increased seven fold. [78] So the development of graphic records not only in science and technology but also in social sciences are becoming so vast that documentation service with its modern technical apparatus is the only solution for knowing their contents.

Communication Need :

Besides, there is the language barrier. Before First World War, there were only few European languages

which were dominant for scientific communication. At that time research workers were much smaller in number, and most of them had ability to learn two or three foreign languages in which learned articles were generally written. But today there are more than 80 different languages in which articles are appearing in periodicals due to the awakening of the countries and development of science and technology all over the world. It is not economical to learn several languages by a research worker and it is not desirable that the research worker should be a linguist and do his own translation because that will merely dissipate his energy and divert his mind from research, nor is it desirable that librarian or documentalist should learn several languages and do translation work. Hence, to over-come the language and script barrier, the services of documentation are introduced. By translation service which is a face of documentation, language barrier is removed by supplying translations of articles through some sort of translation bank at a National Documentation Centre in every country to meet these needs.

Industrial Need :

In the past, research was often a work of joy and

private enterprise, not based on profit or even remuneration. On the other hand today, the industrial enterprises find it profitable and necessary for the industrial development of a country. Since 1850 the industrial development and expansion of trade and commerce led to the establishment of various special libraries attached to them. * Industry has been changed vastly by rapid advances in technology with the introduction of automation which reduce the number of employees on the production line, the proportion of research workers may have to increase to keep the individual company in its competitive position." [79]

There are, however, various kinds of documents, namely reports, plans, charts, diagrams etc. which contain specific information and information of great value to them. These reports, plans, charts may appear in the form of microfilms, manuscripts, type scripts, photostat copies, micro cards etc. All these neo-informations are to be brought to the notice of researchers, administrators and planners of the industries who are always busy and have no time for scanning and reading the huge materials on relevant subject. The solution lies only in documentation work and documentation services

"The industrial organization as well as government research centres or institutes now consider it both necessary and profitable to encourage research in different fields of social, scientific and economic utility of the well-being of the people". [80]

The more significant fact is that a large amount of money may be wasted in industry due to lack of proper information of research results carried somewhere else. the following tables show the amount of money lost for not having documentation service and the savings made through documentation.

Table-2.1

Loss in Research Potential

Sl.No.	L o s s	Field of research	Country
1	Rs 216,000,000	Science in general	U K
2	Rs 15,000,000	Electronics	U S A
3	Rs 18,700,000	Electronic trans- lation equipment	U S A

Table- 2.2

**Savings in Research Potential Through
Documentation**

Sl. No.	S a v i n g s	Field of Research	Country
1.	Rs 16,50,000	Electronic welding	Lithwania
2.	Rs 8,000	Handi-crafts	Sweden
3.	Rs 1,00,000	Clothing	Denmark
4.	Rs 3,00,000	Machines tools	India

These two tables were prepared by Prof A Neelamegham in case studies, and were used by Dr S R Ranganathan in his talk to a large number of librarians in 1970. [81]

There is another very important factor which is worth mentioning here, i.e. speedy dissimination of knowledge and information to the scientists and technologists. Miss Margaret Egan and Dr Jesse H Shera pointed out that with increasing specialization has come increasing fragmentation, not only of literature but also of the groups of individual engaged in producing and using literature. And at the same time necessity for communication among such groups has become more essential. [82]

The duty of librarian and that of the documentalist is

to disseminate the stored knowledge and information quickly both by traditional and computerized methods and they are trying to cope with the situation by means of documentation service and techniques.

Saves duplication of works :

* Apparently the profession of documentation became extremely useful to organizations particularly engaged in intensive research in science and technology. Documentation techniques, scientific and technical research acquired a new rate of growth with the specialized support extended by this profession." [83] Hence it is deemed essential to record that documentation contributes considerably to the saving of duplication of efforts, which saves not only money but valuable time of the potential researcher, scientist and technologist of the world.

Today the users, particularly in the field of science and technology and also in social sciences are more concerned about the accessibility to the contents of the macro and micro documents. But due to the large number of rapidly growing literature which has become

out of control in keeping the record and also to the interdisciplinary nature of scientific subjects, users are facing it difficult to trace the information of their interest. "The corpus of recorded information" as remarked by the Margaret E. Egan and Jesse H. Shera in their introduction to Bradford's book Documentation is the very soil from which all the process of documentation grew and the goal of every one of these processes—bibliographies, abstracting services, indexes and modern mechanical processes is the retrieval of an individual item from among the vast number comprising this corpus of literature. [84]

Documentation developed steadily to the professional stature and its services became increasingly important to those working in pure research, in industry, in trade and commerce as well as in governmental offices. But with the increase in scientific literature traditional library techniques failed to cope with these new demands and as such the researcher began to explore a wide variety of new devices for the tackling and organization of their materials. "They found themselves confronted with the need to organize and service special reports in manuscript, in type script, in photo-offset, in photostat, in micro-film and in microcard. Photographs, plans, charts,

diagrams and other pictorial materials deluged them. Which made them feel an acute necessity for more adequate indexing and abstracting services of the documentation and began to work seriously for sorting of these materials with the machines for the mechanical and electronic organization." [85]

Documentation is thus a new speciality in librarianship; it is a subject to meet the implications of the Five Laws of Library Science as stated by Dr S R Ranganathan. In conformity to the new social needs, the term 'Book' in the Five Laws of Library Science has been generalized to mean the term 'Document' forming part of a book, article in a periodical and every other kind of micro document. In respect of documentation, these laws are capable of furnishing interpretative explanations of all the empirical facts of experience and of the techniques found necessary in experience. With reference to these Five Laws of the Library Science it has been found helpful to define documentation in general terms

1. Promotion and practice of bringing the nascent micro subject into use by specialist (Law-1)
2. Pin pointedly (Law-2)
3. Exhaustively (Law-3)
4. Expeditiously (Law-4) in spite of the

5. Ever-increasing Cascade (Law-5) of specialized nascent subjects communicated through an ever multiplying number of microdocuments. [86]

No doubt, documentation would be impossible unless helped by every facet of library activity from document selection through acquisition, accessioning, classification cataloguing, circulation work, reference service, and maintenance work to every detail of library management developed to a higher pitch of efficiency. It is possible to make special mention of the five facets of documentation which are as under :

1. Documentation work;
2. Documentation Service;
3. Abstracting work;
4. Document reproduction service; and
5. Translation service.

As a result of the study and developments made in the Universe of Knowledge in general and in the field of Science and Technology, Social Sciences and Humanities in particular, every study takes the form of a document and remains the chief source of further study and research. Therefore, documentation service, providing pin-pointed, exhaustive and expeditious information has special

importance in this field, and as such it has become an essential requisite in every branch of Science, Technology and thought.

The technical term 'documentation' has been accepted at the National and International levels and has been firmly established towards the end of the 20th century resulting in the establishment of the Division of Documentation, Bibliothèques et Archive (DBA) of the UNESCO, there was further spread of the term in different countries through the various activities of the Division.

From the historic days of the Unesco-Library of Congress Survey of Bibliographical services of 1948 to 1969 [87] there has been a lapse of over two decades. In this time over fifty new national states have been created, each one concerned with establishing national documentation and information services to meet the needs of national writers, thinkers, scientists and educators. Besides, these centres are concerned with various phases of documentation such as procurement of scientific papers, supply of microfilm or paper photo-copies translation of scientific papers, compilation of bibliographies on specific topics, and publication of current documentation lists or abstracting periodicals. A chronological list of documentation centres have been given here. [88]

<u>Year</u>	<u>Country</u>	<u>Name of Documentation Centre</u>
1947	NORWAY	Norges Teknisk-Naturvite- Næskapelige.
1948	PORTUGAL	Centro de Documentacao Cientifien do Instituto de Alta Culture
1949	RUMANIA	Institute de Documentare Tehnica
1950	MEXICO	Centro de Documentacion Cientifi- fica Tecnica.
1950	POLAND	Centralny Instytut Dokumentacji Nankowo-Technicznej.
1952	INDIA	INSDOC (Indian National Scienti- fic Documentation Centre)
1952	TURKEY	Milli Kutiphane, Bibliografa Enstitusu.
1952	USSR	VINITI (All Union Institute for Scientific & Technical Information).
1953	URUGUAY	Centro de Documentation Cientifi- fica, Tecnica Y Economica.
1954	BRAZIL	Instituto Brasileiro Biblio- graphia e Documentacao.
1956	PAKISTAN	Pakistan National Scientific and Technical Documentation Centre.
1956	BANGLADESH	Bangladesh National Scientific and Technical Documentation Centre.
1957	CHINA	Institute for Scientific and Technical Information.
1957	HUNGARY	Országos Dokumentációs Szakbizottság.

<u>Year</u>	<u>Country</u>	<u>Name of Documentation Centre</u>
1957	JAPAN	Japan Information Centre for Science and Technology.
1957	PHILIPPINES	Division of Documentation, National Institute of Science and Technology.
1960	ARGENTINA	Comision Nacional de Documenta-tion.

All these centres are not following single pattern. Their conditions vary from country to country but common in all of these is the awareness of the value of documentation and Information for the social and economic achievement of the modern world.

The International Federation for Documentation (FID) which provides, interalia, the help in setting up information activities and establishing documentation centres in countries where they do not exist and assisting in the development of existing centres. The FID committee for developing countries formed in 1966 has set itself the task of assisting the developing countries to establish a useful and efficient organization of documentation and information, and in particular to set up documentation and information centres for the optimum national development of those countries as well as for international

cooperation in the field of documentation and information activities. [89] So, there should not be any confusion regarding the new discipline 'Information Science with that of Documentation and Librarianship' which is indispensable for the new techniques and devices to cope with the phenomenal growth of literature world not only for sciences and technology but social science and humanities as well.

Information Science appears to have emerged not only as an expansion and metamorphosis of documentation and information retrieval. The communication and behavioral sciences emerged with documentation and from the outset apparently shared many of its problems. The formative pattern of documentation and information science resembles that of other disciplinary systems.

Thus, today documentation and information activities have been recognized as one of the most effective means of information retrieval. To give efficient and expeditious information to the users it is being practiced by most of the countries of the world.

With the growing awareness of the role of information science, it is realized that proper planning

and development of capability in information handling and dissemination helps in decision making, advancement of knowledge, eliminating duplication of efforts and so on. It is also being realized that in the present day world no nation can prosper without getting high grade information networks. Developing countries need proper planning in establishing information activities for promoting socio-economic development by making full use of scientific knowledge.

T.S.Rajagopalan in an article of 1977 [90] said that during the last ten years library networks have sprung up and many industrialized countries are increasingly recognizing the necessity for network system or planning. Whereas the developing countries are too establishing their national information activities with the help of international organizations. UNESCO/UNISIST, FID, IFLA and other organizations are working together in developing countries in tackling this important problem. [91] In this days the National planning of library and information services have become an accepted responsibility of all governments, for the socio-economic development of the nation.

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CHAPTER XIX

INTERNATIONAL INFORMATION ACTIVITIES
NATIONAL INFORMATION ACTIVITIES : UK,
USA, USSR AND INDIA

CHAPTER III

1. INTERNATIONAL INFORMATION ACTIVITIES
2. NATIONAL INFORMATION ACTIVITIES: UK, USA, USSR & INDIA

It is an established fact that the role of information in social and economic development is being increasingly emphasized all over the world. In fact the development of a country is largely dependant on the application of knowledge and information already available; and such information must be made available to all kinds of information seekers and decision makers of the country. Naturally this requires effective national and international systems and services and these services are basically a network of existing information resources together with new services for identified gaps, so-coordinated as to reinforce and enhance the activities of individual units and thus enable specific categories of users to receive the information relevant to their needs and activities.

After World War II many countries of the world having realized the need for planning of national and international documentation and information activities which are evident by the establishment of their respective Documentation and Information Centres. The first impact of the electronic communication and data processing methods subsequently

introducing computer technology and on-line systems and machines began to have an effect on traditional library techniques and practices. Thus new information technology was launched, coupled with the application of new methods to national systems of libraries and information services. This was the growing research programmes established in the USSR; the USA; the Great Britain and other industrialist countries of the world.

During the last 15 years library networks have sprung up in large number in the USA, but the network systems are not centralized. The US National Commission on libraries and Information Science, which was established in 1970, provided the necessary impetus to evolve a national programme of library and information services.

In 1976 the Library of Congress assumed leadership role in creating a national information network. Similarly in Britain there is partially a de-centralized system of information activities. There is a single organization called the British Library with a specific mandate assigned to it to act as the central Library of UK. But in USSR, VINITI (All-Union Institute for Scientific and Technical Information) has been established which is the world most

comprehensive centralized information system. In USSR Documentation and Information activities have taken great strides during the last few years. The Presidium of the Academy of Sciences realized the need for exhaustive, expeditious and pin-pointed documentation to feed the research workers with the information in the different sectors in the wave-front of knowledge in order to eliminate wastage in research work and to conserve the research potential of the country. Therefore VINITI, established in 1952, has come to be the world's largest centralized information system.

As a developing country India is fortunate having established NISSAT (National Information Systems for Science and Technology) programme intending as a centralized information system. Though INSDOC, DESIDOC, SENDOC, SSDOC and other centres were established independently and have grown in strength and services. The pattern of activities is both centralized as well as de-centralized which is different from the pattern of USA and USSR.

In this chapter the information activities at the international level followed by such activities in the developed countries like UK, USA, USSR have been taken into consideration. India's activities as a developing country has been discussed, the guideline of which may be followed in the establishment of information network systems for science and technology in Bangladesh, the plan of which has been presented in the 4th chapter of this thesis.

I

INTERNATIONAL INFORMATION ACTIVITIES

After Second World War the need for a fresh look at the planning of national and international bibliographic and documentation activities became apparent to librarians and research workers in many countries. [1] In the 20th century a number of national documentation centres have emerged which is required as components of national information systems. Information is resource which together with physical, economic, manpower and technical resources is needed for the development of a country and of society and use of information are such a vital part of development of a country and a society that without these activities there is no development which is increasingly being recognized throughout the world. [2]

Information Explosion:

Schultz in his paper in Nachrichten Documentation (1950) has estimated that there were 12 million books (titles) published during the last 500 years (1450-1950); out of which 10 million were published during the last hundred years.

That means during the early 400 years (1450-1850) only 2 million books could be published against 10 million published between 1850 and 1950. Verner Clapp in his paper Role of Bibliographical Organization in Contemporary Civilization published in Bibliographical Organization (1951) had stated that the population of the United States had doubled by 1950, but the number of copies deposited under the copyright law had trebled and the number of all published items had increased seven fold. [3]

Rider in the Scholar and the Future of Research Library observes that books proliferated at an exponential rate so rapidly that American Libraries which try to collect everything appearing on a given subject double their size every 16 years. [4]

It has been estimated that if a chemist fluent in 30 languages started on 1st January to read all the papers in his particular field for 40 hours a week at a rate of 4 articles an hour, then by 31st December (i.e. after 365 days) he would have read not more than 1/10 of all the material published during that year. The benefit by this process would be nil as the person engaged in this task would have no time left to do anything with the knowledge thereby gained. He would have practically no time to assimilate or

analyse what he could read. Apart from that, there are probably large number of unpublished reports and papers. The crux of the problem lies in the heterogeneity of the overwhelming mass of information in more than 80 languages. [5]

Scientific literature which is a vehicle of information communication is posing serious problem due to its exponential growth. In another article [6] it has been seen that at present about 3 to 4 million articles appear each year in some 30,000 significant journals and as such the apprehension was voiced by a scientist J D Bernal who said that it was sometimes easier to rediscover a phenomenon than to learn from literature that it had been discovered earlier. [7]

It is well recognized that the development of the society in socio-economic point of view, the scientific and technological development in a country is vital. P N Kaula in one of his recent articles expressed that "Wider diffusion and more effective application of science, and technology in industry are essential to growth of economy, higher levels of development, and higher standards of living for the people in a society. The dissemination of specific information pinpointedly, exhaustively, efficiently,

and expeditiously to the needs of the scientists, technologists and all those specialists who work for the transformation of the economic structure of a nation to a better future, has been the crux of the problem." [8]

It has been found that for the communication of ideas, even the Royal Society of London recognized the need for communication of information when it organized the Scientific Conference in 1946 and Conference on Scientific Information in 1948 and stated the following:

"We are entering a new age in the communication of information and knowledge which will require methods as different from those of today as our present techniques are from those of the Middle Ages. There is need for revolution in thinking on this subject, owing to several causes... The question is large and complex. It is difficult and even dangerous to seek to solve individual minor problems without giving due attention to the problem as a whole." [9]

One of the major factors in the development of modern society is its tremendous scientific and technological progress. In a FID news programme [10] it is stated "Today we have reached an era when mankind is experiencing the most rapid and gigantic innovation in intellectual and technological achievements."

The rapidly growing number of scientists and other specialists activity engaged in national and international research and development programmes, associated with communication difficulties, creates a danger of wasteful duplication of efforts. The constantly increasing needs of the world's scientific and technical community for quick access to the information required, as well as for its prompt evaluation and retrieval, make effective international cooperation in the field of scientific and technical information and documentation vitally important. [11] No single country is sufficient to its resources to feed the needs of the researchers, scientists and technologists. It is observed:

" Basic to any effective cooperative programme is the need for mechanisms that enable diverse organizations at both national and international levels to contribute to a common programme." [12]

This calls for organization of information systems on a more sound basis so as to meet the challenge thrown by the information explosion. Under such a situation, man has turned to depend on machines, information technology and library automation have been introduced which provide access from any location to data bases on computers any where in the world. [13]

A national information system is basically a network of existing information resources together with new services for identified gaps, so coordinated as to reinforce and enhance the activities of the individual units and thus enable specific categories of users to receive the information relevant to their needs and abilities. [14] A country can draw up plans for inter-related networks which will deal with various information activities in national and international level.

It has been seen that for the international documentation and information activities there are two levels of organization, [15] exists in dealing with these information activities such as : (1) Inter-governmental e.g. UNESCO ; and (2) Non-governmental e.g. FID, ICSU, ISO, IFIP, IFIP, IFLA etc. These organizations except UNESCO are professional body with an active programme in a specific area of knowledge. One of the main tasks of the UNESCO is the promotion and coordination for further development of documentation and information activities both at the national and international level.

* From the outset, UNESCO has realized the importance of libraries and documentation in the promotion of mutual understanding and in the furthering of economic and social development.* [16]

The fourteenth session of the UNESCO General Conference, which was held in 1966 [17] established the International Advisory Committee on Documentation, libraries and archives, replacing the former Advisory Committee on Bibliography, recommended that priority should be given to the following points:

1. Improvement in the planning of national, regional and international services;
2. Training of personnel, using traditional and new methods;
3. Establishment of common minimum standards for the use of traditional and new techniques and for vocational training programs and
4. Evaluation and use of new documentary techniques and in particular of data processing, considered as an essential instrument for the further development of documentation.

The most important venture of UNESCO was its joint with ICSU in view of information retrieval problems caused by tremendous proliferation of scientific information, the 1966 ICSU General Assembly decided to set up a committee to study the feasibility of a world scientific information

system. It was agreed that this world wide system "should be a flexible network based upon the voluntary cooperation of existing and future information services." [18]

FID : (Federation International de Documentation)

FID is the major international non-governmental organization actively engaged in the field of scientific and technical information and documentation. One of the main tasks of the FID is coordination on an international level of the documentation activities. In the past, "FID has acted as a catalyst for cooperation of national and international organizations engaged in documentation activities. The needs of the time require an extension and retirement of these cooperation activities." [19] Most of the FID activities are carried out through its study and special committees. [20] As for example, the Study Committee on Research on the Theoretical Basis of Information (FID/RI); The Study Committee on Classification Research (FID/CR); the Central Classification committee (FID/CCC); the Study Committee on Linguistic in Documentation (FID/LD); and the Study Committee on the Theory of Machine Techniques and Systems (FID/TM). Other major committees are :

The Study Committee on Information for Industry (FID/II);
The Study Committee for Training of Documentalists (FID/TD);
The Special Committee on Developing Countries (FID/DC).

The FID programme mentioned above clearly proof a very important factor; the Federation activities cover not only theoretical problems but also practical ones, thus keeping FID abreast of all modern developments in the field. The incre~~a~~singly computerized information is universally recognized and the FID/TM and FID/OM committees bring the Federation closer to On-Line computerized information systems. "The effectiveness of the entire system of scientific and technical information largely depends on the qualifications of the documentalists who, in the process of their work, should be aware of the latest achievements in science and technology, as well as the needs of the national economy. It is widely known that only competent information specialists can assure a quick, comprehensive and up-to-date information service to the scientific and technical community, thus contributing to the success of many research and development projects." [21] FID emphasized importance on classification particularly on UDC for further development which is widely used in a computerized information system in Denmark.

the USA, the USSR and Western Germany. R R Freeman and Pauline Atherton said that the UDC can be used in an On-Line, interactive system. Already existing conversion table could make possible the searching of UDC-indexed files disregarding linguistic barriers. [22]

It is generally accepted that the FID's assistance in establishment of national information services of the developing countries is one of the major tasks of this international organization. FID, has submitted some recommendation to the ICSU-UNESCO Central Committee for the work carried out under the joint ICSU-UNESCO feasibility study for the establishment of world science information system. Reporting to the ICSU Executive Committee on the feasibility study, Harrison Brown, Chairman of the ICSU-UNESCO Central Committee, said:

" The purpose of the study is to promote compatibility among the science information systems being created in many countries and in several disciplines." [23]

The FID has its aim in reaching such a compatibility by creating a concordance between UDC and other classification schemes. The FID has an effective cooperation with more than fifty international governmental and non-governmental organizations for the development of scientific

and technical information and documentation. It has close working contacts between FID and UNESCO, ICSU and its Abstracting Board, IFLA, ISO, IFIP, CIB (International Council for Building Research, Studies and Documentation) and many others. The growing cooperation between the FID and IFLA has been established for training, assistance to developing countries. W K Lowry said,

" It is imperative that IFLA and FID must work in concert to avoid dilution of our total resources in working toward common goals." [24]

I S O : (International Organization for Standardization)

The International Organization for Standardization (ISO) was set up for the development of standards to the entire information and library community of the world. This organization is working in keeping close cooperation with UNESCO, ICSU, FID, IFIP and IFLA for achieving the highest possible degree of uniformity of world documentation and information activity through its 120 technical committees. This organization up to 1969 adopted more than 800 recommendations while more than 900 draft recommendations were being studied. [25]

ICSU : (International Council of Scientific Unions)

International Council of Scientific Unions is also a powerful organization for the world of scientific community. In 1966 ICSU embarked, jointly with UNESCO, on an extremely important project relating to the communication of scientific information. ICSU-UNESCO joint undertaking were responsible for studying the feasibility of a world science information system. The ICSU-UNESCO working party comprising under the chairmanship of Professor H Brown (representative of ICSU) Dr B W Adkinson (United States) Professor G A Bontry (President ICSU-AB) Prof F S Dainton (United Kingdom) Prof H Kaiser (Federal Republic of Germany) Dr M Kotani (Japan) Mr J d'Olier (France) Dr A Perez-Vitoria (representative of UNESCO) met in January 1967 to define the broad outline and the guidelines of the proposed world science information system. [26] ICSU-AB (ICSU 'Abstracting Board') is a special body within ICSU general framework. The main function include the coordination and improvement of abstracting of the world scientific literature. The ICSU-AB and FID has a good relation for an effective cooperation among the primary and secondary information activities.

UNISIST : (World Science Information System)

UNISIST is an acronym covering the feasibility study of the world science information system. The idea of establishing a world science information system was first conceived by the UNESCO and for which many schemes have been drafted at least on paper. For this purpose, V Asmonus [27] submitted a proposal for UNESCO's consideration a project for the establishment of a tripartite international centre of scientific and technical documentation having headquarters in the United States of America, Switzerland and Hongkong and a national centre to act as the heart of information service. Chamberlin proposed an estimate of \$ 283,350,000 for the annual budget of an international institute for scientific information in the international conference on scientific information held in Washington in 1958. [28] Its main function would be to assist the scientist of all nations. However, all these proposals and many others were not successful at the time.

In these circumstances, ICSU and UNESCO in 1966 were each considering ways by which the transfer of scientific information could be more efficiently effective on an international scale so as joint ICSU and UNESCO working party was

convened in January 1967 [29], one of the recommendations was the proposed world science information system UNISIST should be a flexible network based upon the voluntary co-operation of existing and future information systems.

ICSU

The UNESCO/~~IC~~ Central Committee which was created in January 1967 as mentioned in earlier paragraph to carry out a feasibility study of World Science Information System-UNISIST, which study continued for about four years and the report entitled UNISIST in 1970 study report on the feasibility of a world science information system by the UNESCO/ ICSU was published and widely distributed and at the same time another document UNISIST-Synopsis was released in 1971 [30] bearing valuable information for information transfer.

The inter-governmental conference for the establishment of world science information system (UNISIST) took place in Paris, (UNESCO' Headquarter) in 1971 [31] where the basic principle as previously reported, stipulate that UNISIST stands for the unimpeded exchange of published scientific information among scientists of the world.

The UNISIST programme is then an international effort to solve various problems by creating mechanisms and

organizations necessary for undertaking the appropriate actions. A total of twenty-two recommendations [32] are submitted by the study committee. The last recommendation is on the organization of the UNISIST. The study report recommended 3 interrelated managerial bodies. [33]

1. an inter-governmental conference responsible for approving UNISIST'S programmes and reporting on their progress ;
2. an international scientific advisory committee;
3. an executive office serving as permanent secretariat of UNISIST.

The General Conference of UNESCO at its 17th session (Oct-Nov ,1972) created a steering committee for guiding and supervising the planning and execution of the programme. For 1973-74, eighteen members were elected to the steering committee, including India, Japan and China.

NATIS:

The Bibliographical events of the present century reveal a good picture that we were very close to international

cooperation of bibliographical and information activities. An Intergovernmental Conference on Planning National Documentation, Library and Archives infrastructures was held in September 1974 [34] where emphasis were given to promote and create their (member states) national information systems (NATIS) in such a way as to ensure co-ordination at the national level and to prepare the basis for active participation in world information systems.

During 1975-76, therefore the Department of Documentation, Libraries and Archives of UNESCO would have a major task the implementation of actions designed to assist in the establishment or improvement of National Information Systems (NATIS) in a member states, taking as a basis , the objectives mentioned in the final report of the inter-governmental conference. [35]

INIS, AGRIS:

There is recent trend towards successful international information systems, namely, the International Nuclear Information System (INIS) and the International Information System for the Agricultural Sciences and Technology (AGRIS), on the model of INIS, has already

become operational. Two more systems, namely, Development Science Information Systems (DEVSIS) and Science and Technology Policies Information Exchange System (SPINES) have been planned. [36] Hence INIS shows the future. INIS is a co-operative scheme, involving the International Atomic Energy Agency (IAEA) since 1965 [37] has promoted among its member states (more than ninety) the establishment of an information network INIS (International Nuclear Information System). While considering the creation of a world wide system for nuclear information, IAEA took into account all the major existing services. INIS is intended to be an extensive of the activity in which modern computing techniques will be applied to the task of disseminating information dealing with nuclear science and its peaceful applications. The system had been under study for about two years and finally the board has been started operation during the calender year 1970. [38] INIS a computer-based system set up jointly by the International Atomic Energy Agency and its member states, would be announcing most of the World's Literature dealing with reactors and reactor materials, uranium production and fuel cycles; nuclear techniques in food and agriculture; health safety and waste management; isotope production, industrial applications of radiation. [39] The subject, scope, the

amount of literature that is to be treated by such a system can vary between 60,000 and 120,000 articles per year. However, the volume of literature would expend into the order of 85,000 to 90,000 articles per year. [40]
But from another article it has been found that INIS aims for about 1,00,000 items of information a year. [41]

AGRIS :

Agricultural Librarians and Informations Scientists all over the world had started feeling for an Agricultural information system of the world as their were frustration with the control of agricultural literature. Thus towards the end of the Sixties Sir Thomas Serivener, Secretary of the Common Wealth Agricultural Bureaux, wrote to the Director General of the Food and Agricultural Organization (FAO) of the United Nations suggesting him to sponsor an investigation of the feasibility of organizing international co-operation in the field of agricultural information. [42]
The overall system of world agricultural information thus envisaged was given the name, International Information System for the agricultural sciences and technology (AGRIS).
AGRIS is, in the field of agriculture, the first truly

international co-operative programme; AGRIS has followed many procedures and practices from such other programme like INIS (International Nuclear Information System).

FAO conference of Member states was held on November, 1971 [43] where formally resolved to support the AGRIS plan. It was also estimated that AGRIS may have to deal with some 210,000 references a year, produced from many countries and in many languages.

AGRIS is now well established and the broad international input base in the world being specially important as a source for agricultural literature from developing countries. AGRIS become fully operational in 1975 with volume I, Number 1 of AGRINDEX appearing regularly from January 1975. [44]

AGRIS is a completely decentralized system based on willing co-operation of individual countries.

The number of scientific and technical journals published today is far too great for each library of the world to acquire and index them all. Abstracting and indexing services extend the basic purpose of the library -- to provide users with information or documents by making users aware of the available literature. Some library have

abstracting and indexing programmes. It has been seen that ~~these~~ national libraries in the United States are deeply involved in the production of indexes or abstracts disseminating content analysis of a significant portion of the literature they acquire. The National Library of Medicine (NML), the world's largest biomedical library, devotes a substantial amount of its resources to abstracting and indexing services. [45]

MEDLARS is a computer-based information system designed to cope with the tremendous growth of biomedical literature and the corresponding information requirements of health scientists, practitioners and educators. One product the Index Medicus is a comprehensive monthly, subject/author index to articles from approximately 2400 of the world's biomedical journals. National Medical Library (NML) also produces recurring bibliographies or periodical lists of citations in specialized medical-subject areas. [46]

A unique way in which libraries support abstracting and indexing efforts is the List of Periodicals Abstracted by Chemical Abstracts. Every five-years since 1922, 400 libraries around the world have checked their holdings

of scientific and technical journals, conference —and symposia type publications and patent specifications and have provided data on their holdings for this list. [47]

BIOSIS :

BIOSIS is the world's largest abstracting and indexing service for the life sciences. It is an independent, non-profit organization which, through nominations to its Board of Trustees, maintains liaison with many biological societies and institutions, including two of its founding organizations, the National Academy of Sciences and the American Association for the Advancement of Science, as well as the American Institute of Biological Sciences and the Federation of American Societies for Experimental Biology, successors to the Union of American Biological Societies.

In 1969, BIOSIS published its two millionth abstract. It is interesting to note that the first million abstracts were compiled over a period of 34 years, whereas the two million milestone was reached in eight years and ten months later. The gathering, intellectual and technical processing, and dissemination of the vast

bulk of literature had been made possible by the combination of two elements : an expert professional staff devoted to its work and modern electronic equipment.

BIOSIS today has a regular staff of more than 170 highly-skilled and specialized employees. In addition, about 130 bioscientists throughout the world help to select, abstract and translate the literature, and its subsequent dissemination in whatever format or packages are required to fulfill the needs of the biologist.

The literature covered consists of original biological research reports and reviews of research, as well as literature pertaining to the documentation and retrieval of bioscientific information. Biologically oriented papers published in interdisciplinary journals are included also.

BIOSIS' current annual coverage in Biological Abstracts and Bioresearch Index totals almost a quarter million research papers -- triple the volume covered a decade ago. This three-fold increase in coverage was accomplished during a period when the volume of literature doubled. Access to 20,000 additional references is provided each month from a total publication base of approximately 8,000 publications.

The products and services of BIOSIS include: [48]

BIOLOGICAL ABSTRACTS:

It covers the entire spectrum of life sciences and is classified into more than 625 topics and subtopics. It is issued twice each month and includes 140,000 abstracts annually.

BIORESEARCH INDEX :

This monthly publication, provides citations to 100,000 additional research reports annually which do not appear in Biological Abstracts. These reports include symposia, thesis, abstracts, review journals and books, trade and natural history journals, institutional and government reports, bibliographies, and research articles in the form of letters to the editor and notes.

LIST OF SERIALS:

This is revised annually and contains full serial titles with their abbreviations, country of publications. The latest List of Serials contains 7,661 active titles from 101 countries, territories and common-wealths.

BIORESEARCH TODAY :

A series of monthly journals covering specific subjects of investigation. Each monthly issue consists of abstracts relevant to the subject area which have been abstracted from Biological Abstracts.

BIOLOGICAL ABSTRACTS :

Biological Abstracts on microfilm comprises the entire collections. Current abstracts are added to the 16 mm microfilm record at approximately eight week intervals. Every film contains code-line and image control indexing.

BA PREVIEWS :

A magnetic tape service which makes available, approximately one month in advance of the printed copies, the references published in Biological Abstracts and Bioresearch Index. The user is able to create special files in machine language, based on topics of interest, or to consolidate the tape into a master file for retrospective searches.

ABSTRACTS OF MYCOLOGY :

It is published monthly and contains more than 10,000 abstracts and citations annually.

CLASS : (Current Literature Alerting Search Service)

It is a custom search service based on an individual scientist's customized profile which defines his question or problem language compatible with the BIOSIS computer file. Semi-monthly printouts are provided.

Retrospective Search Service :

It is a custom search on the complete machine-readable Biological Abstracts data files from 1959 to date, and Bioresource Index from 1968 to date. This retrospective service, like its counterpart CLASS, is custom-tailored to the individual's information needs. Photocopies of bibliographic citations and abstracts are provided to the user.

The commendable developments in the fields of computer technology, telecommunication including satellite communication, micrographics, photocomposition etc. are

now promising methods of handling the vast amount of bibliographic information of documents. The advent of electronic computer has also provided a new dimension for bibliographical information. It has been predicted that the visual display unit would have considerable impact on the transfer of bibliographical information. Some of the visual display units provided with keyboards are used in the information world as interactive terminals with a computer.

Two recent developments in the communication systems have been noticed : (1) Facsimile and (2) Videophone. Facsimile telegram requires 15-20 minutes to transmit information over a telephone line, and it also been found that ultrafast facsimile needs only 2-3 seconds for the transmission of document 21 x 29 cm in size. Videophone operates in realtime which means that within 1/25 of a second both voice and image are transmitted. [49]

Advances in communication technology has led to the development of specialized information transfer and communication systems, which are more user-oriented. These systems are expected to be designed for an on-line interactive mode operation with the user in mind, rather

than an information specialist. Future on-line systems would be oriented towards natural language than the controlled vocabularies and would require much less effort on the part of the user. It is envisaged that the systems would include facilities for error compensation, audio-videodisplay and touch panel devices. Another future possibility is the use of domestic TV receiver, in home or office, as terminals that can be used to query remote bibliographic data bases. It is also likely that one will see increased emphasis in the future on the systems that will provide on-line support to personal files.

CRRERIS : (Commonwealth Regional Renewable Energy Resources Information System)

A meeting of the Heads of Government of the Commonwealth Countries (CHOGRM) of the Asian and Pacific region was held at Sydney, Australia 1978 where it was decided to establish a consultative working group on energy. And as an important issue, the inaugural meeting at New Delhi was held in the same year, where it was agreed to establish a regional information network on renewable energy which system would be called the Commonwealth Regional Renewable Energy Resources Information System (CRRERIS) has been established at the

Commonwealth Scientific and Industrial Research Organization
(CSIRO). [50]

CRRERIS consists of a network centre located at
the CSIRO, Melbourne, Australia and a large number of
Liaison Centres in CHOGRM countries, namely :

Australia
Bangladesh
Cook Islands
Fiji
India
Kiribati
Malaysia
Nauru
New Zealand
Niue
Papua
New Guinea
Singapore
Solomon Islands
Sri Lanka
Tonga
Tuvalu and
Western Samoa

CRRERIS has set out to develop a computer based bibliographical data base providing references to publications originating in member countries and relating to all aspects of renewable energy resources, together with the establishment of a document clearing home.

The main activities of the Liaison Centres would be the identification of documents, and the provision of a copy of each, together with indexing information, to the network centre for processing. The data base is being used to produce an index called the Commonwealth Regional Renewable Energy Resources Index (CRRERI). [51]

II

NATIONAL INFORMATION ACTIVITIES: U K

One of the basic requirements of every industrially developed country is a network of public and non-public agencies that specialize in planning and co-ordinating the growth of scientific, social and technical information system necessary to meet the needs of economic and social development. [52] Information activities have played

an important role in human affairs throughout the history of mankind. In the United Kingdom the information activities are carried out in various technical national and institutional libraries, but it is like the unwritten constitution of the British as one can say that there is no central information centre in Britain to govern the growth of such services. [53]

Dr. S R Ranganathan, during his visit in the U K in 1950 [54] has remarked that the United Kingdom is the second country to sense the importance of Documentation and Information activities in the progress of research and Information activities in the progress of research and industry and for this purposes it founded in 1924 its ASLIB (Association of Special Library and Information Bureaux) whose main objectives is to promote information activities in the UK. One theme which crops again and again is a request for information about British National Policy relating the information and library activities, this question at present can be answered only in part because unlike many other Western European Countries, there is no readily discernible British Policy in Library and Information Systems. On the other hand the British Government abolished the Department of Scientific and

Industrial Research (DSIR) following the report of the Trend Committee on the reorganization of Civil Service in 1963. [55]

The Council of Scientific and Industrial Research came into being in most of the commonwealth countries between the last great wars and in most cases these organizations have played a vital part in formulating and administering the national information policy of the country. It is true that the main objective of such organization has been the development of scientific and technical information of the country. The responsibility which were vested in DSIR for systematic exploitation of information in the UK was replaced by the establishment of OSTI (Office for Scientific and Technical Information) in 1965. [56]

Within the Department of Education and science and has proved to be an important instrument for progress and planned development, especially in financing and controlling research in documentation. OSTI is responsible for its activities to the Secretary of State for Education and Science DSIR's functions in the field of technical information and liason services for industry was taken over by the Ministry of Technology.

The industrial functions of the Ministry of

Technology was transferred to the Department of Industry, which also include the services of the Industrial Liason Officer (ILO) services. Which was perhaps, one of the most successful examples of government involvement in information dissemination. But unfortunately the ILO services came to an end with the publication of the report of the Bolton Committee on Small Firms in 1971. [57] The main components of the British information network are primary publications, secondary publications, general libraries, special libraries and information centres and special information services for Industry and Agriculture. [58]

Primary publications in the Great Britain are a major traditional contribution of the learned societies and professional associations which also diffuse information through meetings, conferences. It has been seen that there are nearly 400 abstracting and indexing systems in UK, all of them are technological in character and providing specialized services. Zoological Record and the 13 abstracts journals produced by the Commonwealth Agricultural Bureau and financed by Commonwealth governments. Mention may be made of some other high quality larger system which are earned name both at home and overseas e.g. "Metallurgical Abstracts", "Mineralogical Abstract" and "Index Kewensis".

Information Services in University Libraries:

The principal scientific information activities are provided by the Universities and Colleges of Technology in the United Kingdom. Although Information Services in University Libraries might be seen from as far back as 1939. [60] It has noticed since the mid-sixties that the information activities has been seriously developed by the University Libraries in the United Kingdom. It has been said that such developments were largely been confined to the technological Universities. [61] A survey was made of the information services providing by the University Libraries in the United Kingdom which was held at the University of Bradford in December 1973. [62] Under this survey, sixty-nine universities were included which revealed that the principle of information provision is widely accepted in all these university libraries, with the highest level of service being provided by the Technological Universities. About one third of the libraries had staff devoting most of the significant part of their times to information work and it has been noticed that 50% and 60% offered literature search, current awareness services and publicity for or assisted with computer-based information services. [63] In this survey libraries fall into four broad categories :

1. Civic universities (including the Scottish universities and most of the colleges of the university of wales);
2. Colleges of the University of London;
3. Ten 'New' universities established between 1961 and 1965; and
4. Ten technological universities mostly former colleges of advanced technology established between 1964-1969.

Information services in university libraries have their origins in the choice of subject specialization as the staffing pattern by many of the new university libraries and the consequent emphasis on specialist service to readers, and they found their strong impetus with the establishment of the technological universities. [64]

Among the 69 university libraries, survey revealed that 48 libraries (80%) offered guidance in the use of information sources, 36 libraries (60%) offering literature searching which is most time consuming forms of information services [65] and 43 university libraries (71.7%) provided information on the type of reader who used reference services most heavily, [66] 15 libraries (25%) managed to provide manual SDI Service to their users. [67]

Computer-based Information Services:

The operation of SDI profiles may be the solution to the problem of current awareness provision in universities, at least in terms of the manpower required, the increasing interest in On-Line systems seems to indicate that computerized retrospective searching, has its activity in information services in universities and 38 libraries (63.3%) a majority of all categories except the London Colleges (A table has been given below) [68] did, in fact indicate that they were engaged to some extent with computer-based information services.

Table-3.1

Computer-based information service in the University libraries

	Civic	London Colleges	New	Techno-logical	Total
Libraries involved in some way	16 66.6%	4 30.8%	6 60.0%	12 92.3%	38 63.3%
Libraries with funds available	7 29.2%	2 15.4%	4 40.0%	4 30.8%	17 28.3%

(Percentage are of the total replies received from the each category of the university libraries)

However, fund is the important factor for introducing computerized information services in the United Kingdom and as such all university libraries are not fortunate, only 17 were in this enviable position. A number of libraries, however, anticipated a steady increase in the annual allocation over the 1972-77 quinquennium. One Civic University, for example, quoted an allocation of £ 2000 p.a. rising to £ 3500 p.a. and one unusually well endorsed new university expected a terminal £ 9500 p.m. The libraries which did not have any funds available at all, two London colleges reported that the question of finance for computer-based services of information activities was under discussion within the university. [69]

The rise of the computer-based services and the need to budget for their use may further accelerate the consideration of information provision in university-circles and the coming quinquennium seemed likely to be of particular importance in the development of information services in universities of UK. [70]

A study of the published literature and of annual reports of university reveals some of the main developments in information activities in university libraries. The

ity, Surrey and Loughborough University Libraries have established information sections while in other technological university libraries, Bath and Bradford, for example, services are provided by subject specialist information officers. Information services are also sometimes provided from departmental libraries, for example, the Town and Regional Planning Library at Sheffield and the library of Electronic Engineering Science at University College have developed information services in their subjects. [71]

Some of the university libraries, as for example, four civic, one London college library and three technological libraries in the United Kingdom were practicing on-line system for information retrieval. Three university libraries were involved with the OSTI [72] on-line information retrieval project.

In some of the university libraries of the United Kingdom they appointed information officers for dissemination of information activities, mentioned may be made of the universities such as Belfast, Newcastle, Reding and Southampton University libraries and similar appointment have also been made by OSTI at Birmingham, Cardiff, Imperial College, Salford, Struthelyde and Sussex

Universities. There were also experimental information officer at Durham University as part of the PEBUL Project. [73]

Register of U K :

In the United Kingdom there is Research Register [74] which is the most concentrated means of dissemination and retrieval of research information in the country. There are several registers of research published in the United Kingdom such as Research in Progress of the Library Association, OSTI'S Newsletter (it has been replaced by British Library research and development news letter), Scientific Research in British Universities and Colleges (SRBEC), Department of Trade and Industry research register, Social Science Research Council Newsletter, Research in Librarianship, college of Librarianship, Wales, Research bulletin, other UK sources of research information. All the above mentioned registers maintained the records of the research projects carried out in the UK. The publication of new research reports can be noted in Library and Information Science Abstracts also

Library Advisory Councils :

The Government of the United Kingdom established two Library Advisory Councils as per Public Library and Museums Act of 1964, which came into force from April 1965 [75] to advise the secretary of State upon such matters connected with the provisions or use of library facilities. (The Library Advisory Councils, one for England and one for Wales). Though these councils existence resulted from the Public Libraries Act, the activities and advices were not restricted on only Public libraries. In fact the Act specifically laid down that " Each Council shall include persons who have had experience of the administration of the service provided by library authorities and also persons who have had experience of the administration of libraries managed by bodies other than those authorities".

[76]

The developments in the formulation of a national information policy which are now taking place in the United Kingdom can be traced back to the Dainton Report on National Libraries when feeling was running high on the issue of the British Museum, its structure and future — a time when in fact the government and the Trustees met in head-on conflict. [77] The main functions of the committee were

" to examine the functions and organization of the British Museum Library, the National Central Library, the National Lending Library for science and technology, and the science museum library in providing national library facilities to consider whether in the interest of efficiency and economy such facilities should be brought into a unified framework; and to make recommendation." [78]

Aslib, in its evidence to the Dainton Committee which appeared in 1969 [79] had suggested for the planning of the services and operations of a National Library as an integral part of a planned national library and information policy and further recommended for the creation of a National Information and Library Authority, on which the responsibility for the coordination of the library and information activities would be rested and with the national library would work as a sub-unit of such an authority. The Dainton Committee did, in fact propose in its recommendation, the establishment of a National Libraries Authority but with limited function to the operation and development of the existing national libraries. [80]

The 20th century has witnessed the maturity of the growth in the United Kingdom of a large and efficient range of library and information services, public academic

and specialists to meet the needs of education science and technology, industry etc. These development were being rapid and haphazard, generated heavy pressures for the creation of a centrally provided information services. The establishment of the institutions are also designed to provide the central services which was also in haphazard condition. In this sense it was the Brasenose Conference on the automation of libraries held in Oxford in 1966 [81] which first brought the large national libraries together. The measure of this progress can be estimated by comparing present achievements and projects with the situations as documented in an Aslib report [82] which surveyed the state of mechanization to the United Kingdom in 1965.

In the year 1968 it had become apparent that the bibliothecal riches and information potential of these islands being rich but arrangement were being confused and wasteful and also were hindering the development of a good and effective infrastructure better suited to the needs both cultural and economic of the United Kingdom, and for these confusion in the development of library and information activities, then Government had set up National Libraries Committee to consider whether in the interests of efficiency and economy the major institutions providing central services should be brought into a unified frame work. [83]

The National Libraries Committee which was set up by the Government of the day to examine the present conditions of the central institutions [84] (also mentioned in the earlier paragraph) principally concerned were the British Museum Library, including the National Reference Library of Science and Invention, the National Central Library, the National Lending Library for Science and Technology, the British National Bibliography and the Office for Scientific and Technical Information excluding two National Libraries of Scotland and Wales which are basically directed towards meeting the special needs of Scotland and Wales. Some details of the above mentioned National Institutions [85] are stated below:

British Museum Library : (B M)

B M possess nearly 8 million bound volumes and 40,000 titles of periodicals. It is a depository library for the British books. British National Bibliography, which is situated nearby, makes use of these publications in the compilation of the Bibliography. It is a closed access library except the Reading Room, where reference books are kept. The present scientific publication holdings are to be merged with the collections of the

patent office library to form a National Reference Library for Science and Technology.

National Lending Library :

The main function of this library is to Lend publications mainly journals and reports to organizations who are on an approved list of borrowers. The requests have to be made on loan request forms or on Telex against a loan order number. Nearly 10,000 requests are received every week and 80% of the orders executed are despatched within 48 hours. At present NLL is able to meet 75% of the requests from its own resources, and the Science Museum library meets another 8%. About 25,000 titles of periodicals are currently received, which are arranged alphabetically by titles. It also acquires all Russian Scientific books and reports. The National Lending Library has done some excellent pioneering work with its courses for University Scientists and Librarians in the use of existing literature and information sources. This course is being a short one only two weeks which has proved a very useful for the Scientists and Librarians.

National Central Library:

The National Central Library of the United Kingdom was started in 1916 and it was reconstituted in the year 1931 as the National Central Library to serve as the apex of a national interlending system. This National Central Library also serves as the British National Book Centre for the allocation of duplicate books and periodicals. The activities of the compilation and production of the British Union Catalogue of Periodicals (BUCOP) is being done by this library.

Science Museum Library:

It is the National Library of pure and applied science of the country. The main objective of this library is to serve the staff and the post-graduate students of the Imperial College of Science and Technology as well as other colleges in the area. The procurement is fixed only on scientific books, it has got one of the largest collection of scientific periodicals, it receives 10,000 periodicals titles and it maintains a close access system.

Aslib :

The Aslib (Association of Special Library and Information Bureaux) is the most important organization in the United Kingdom, established in 1924 with the objective to promote information and library activities co-ordinating with various information centres in Britain. Aslib is at present actively concerned with collecting information on mechanization of library routines as well as storage and retrieval of information, the machinery available and its suitability for such applications have been surveyed. Aslib is offering an efficient technical service to members on information problems. Some short courses on various aspects of special librarianship are being carried out by this organization in the United Kingdom. A new development has been introduced by the establishment of abstracting and co-ordinating courses. Besides, conferences and technical group meetings are being organized by the Aslib and its activities are being recorded in the Aslib Proceedings which is published monthly. The Journal of Documentation, being its official organ published quarterly, which is a renowned journal in the field of library and information science. And another important publication of Aslib is the 'Index to Theses'. This

publication contains the recording of all the accepted theses of the Universities of Britain.

OSTI : (Office of the Scientific and Technical Information)

The Office of the Scientific and Technical Information was established within the jurisdiction of the Department of Education and Science in April 1965 to replace the Department of Scientific and Industrial Research (DSIR) following the report of the Trend Committee on the re-organization of Civil Service in 1963. This organization has come into being to promote further activities on information problems and to co-ordinate the work of various organizations interested in this field of library and information science. OSTI has supported 5 projects in the field of structural linguistics, each involving collaboration between linguistics, computer specialists and mathematicians and further initiated 5 more projects which were in one way or the other aimed at better retrieval of information. In one of the projects of OSTI is in the Sheffield University forms part of a planned British contribution to the vast programme of research and development at the Chemical Abstracts Service. The aim

of this programme was to develop a mechanized information service and this organization supports three major activities:

1. Data Centre on mass spectrometry at Atomic Weapons Research Establishment;
2. X-ray crystallography centre at Cambridge University ; and
3. Thermodynamic data centre at Imperial College, London.

It has been said in earlier paragraph that the 20th century was the remarkable period for the United Kingdom when large and efficient range of library and information centres public and non-public, academic were established to meet the information needs of the scientists, researchers and technologists, but these growth were rapid and haphazard which generated strong pressures for the creation of centrally provided services. And by 1968 [86] it had become apparent that the arrangement were confused and wasteful which were become barrier for the development of an effective infrastructure of the information services of the UK, and the Government set up a national libraries committee, whose recommendation was

that the administration of the above mentioned National Institutions under review should become the responsibility of a new statutory and independent public body. The Government of the UK considering the recommendation of the committee which was submitted in 1969 [87] consulted the governing bodies of the above mentioned institutions concerned and announced that five institutions would be transferred to a new organization which would be known as the British Library. A Board of Management was set up in April 1973 for this new organization followed by the progressive transfer of staff functions and collections to form the British Library for United Kingdom.

The Government of UK has taken this decision combining the five separate institutions for the effective articulation of the functions, would have a profound influence on the future efficiency of the library and information structure of the United Kingdom. It would also help central planning and management and by this action unnecessary duplication can be avoided and full benefits of working on a United Kingdom scale would be achieved of the institutions concerned were brought together in one organization, centrally financed and directed. [88] Soon after the establishment of the

British Library, the Board of management set up extensive advisory machinery to ensure the performance of its activities to meet the needs of users. Advisory Committees were also set up to provide the expert advice and assistance needed for the libraries operations. And as such five such committees were formed to advice the Lending Division, Bibliographic Section, Reference Division, Science Reference Library and the Research and Development Department. [89]

It is clear that the responsibilities of the British library are being very wide and comprehensive from the start designed to serve the United Kingdom as a whole and it will be much more helpful for the formulation of the National Information System of the Britain in future.

Automated Information Services:

Britain is now seriously thinking that they must develop suitable techniques for controlling the growth of the scientific and technical literature, which resulted by the automated information services in the British library (BLAISE) is the new name in the Library and Information Science, it is an on-line house keeping and information service based on information retrieval software.

BLAISE will provide on-line access to the MEDLERS and the MARC files with access to the former in the Spring of 1977 on an IBM-370 computer at a bureau in Harlow, Essex. [90]

P L Holmes [91] said that the British Library Automated Information Service (BLAISE) would be a fully operational and fill up the gap before the library can put its own software (the MERLIN Software) on to a UK-developed computer and through BLAISE libraries in U K would built up a market for on-line library and information services. Besides, BLAISE include subject-type searching. The retrieval system would allow searching with a range of index terms and the users would be able to exploit the MARC tapes to provide information services to users and also could provide bibliographies to the users. It was understood that the retrieval system would allow record selection for cataloguing purposes using a variety of search keys in addition to the ISBN, LC and BNE number. It was also expected that BLAISE could support many library operations including cataloguing, book ordering, acquisitions and inter-library loans, by having records available for inspection on-line bibliographic checking, and lastly BLAISE must have a major function in the developing national network, being acted as a central source of records for libraries to use for their local library purposes, using their own small computer systems. [92]

Apart from some pioneering but limited applications in industrial information centres (mainly in chemical technology) there was no broad involvement until duplicate tapes from MEDLARS, and later Chemical Abstract Service, became available. The service for retrospective searches of bio-medical literature based on the MEDLARS tapes has been operated jointly since May 1966 [93] by the National Lending Library (N.L.L.) at Boston Spa (before amalgamation with British Library) and the computing laboratory of the University of Newcastle, supported by contract with OSTI. Finally as part of its co-operation with the National Library of Medicine (N.L.L.) has been preparing British input for transmission to MEADLARS. The British Chemical Society has set up a Research Unit in Information Retrieval and dissemination at the University of Nottingham in August 1966 [94] in collaboration with the American Chemical Society, to exploit the magnetic tape versions of Chemical Titles and Chemical-Biological Activities (to which Chemical Abstracts was added later).

A current awareness service based on user profiles had been provided free to selected chemists, consisting of fourteen collaborating laboratories in Universities and Industry, the aim of which was to find out how this new type

of service can meet user needs and what further educational effort could be made. In spite of the difficulties inherent in full-text searching the unit has been successfully on the whole as indicated in the first annual report in a article by its director. [95] Thus the work of the unit was then being extended to investigate methods of providing retrospective searches and On-Line applications to improve search performance by direct interaction between user and the machine.

The Aslib Research Department has been involved in computerized production of lists, bibliographies, indexes, computerized control of library loan records, the detail systems analysis and costing of all clerical procedures of a University library. With the increasing popularity of co-ordinate indexing, standard techniques were being studied for the construction of thesauri. Surveys of the needs and behaviour of information users have included technical libraries and the use as measured by citation, of the literature of science, technology and the social sciences. In broad terms research will be directed towards an evaluation of the "effectiveness and the efficiency of information transfer." [96]

In an article of T S Rajagopalan [97] it has been noticed that Britain is known for a long, library tradition. There existed before a number of separate and uncoordinated national library services with overlapping interests. Now there is a single organization called the British Library with a specific mandate assigned to it to act as the national library for U K. An essential feature of the present British model is partnership and mutual interdependence. No attempt is made to superimpose coordination.

III

NATIONAL INFORMATION ACTIVITIES : USA

One of the basic requirements of every industrially developed country is a network of public and private agencies which specialize in planning and coordinating the growth of scientific and social science information systems necessary to meet the needs of economic and cultural development. However, " the problem of scientific and technical information is neither a simple one, nor a single one. Rather it consists of a multiplicity of

problems affecting the users of information, the processors and handlers of information, the federal government, and ultimately the national welfare." [98]

A large number of scientists, committees and organizations, executive branch and the congress have pointed out that the USA had been facing a defacto national system, to the deficiencies and limitations of the national system for handling scientific and technical information. The problem was developed more in USA when world-wide awakening to the realization that information is one of the most precious of national asset resources. The information problem is much more than the some of local annoyances, inconveniences, and dissatisfaction with document information system. The natural resources of the United States represent a national asset, and it is one of the great strengths for the USA that the great array of intellectual, scholarly, and research resources to be found in its libraries and information centres. [99]

The knowledge explosion is being a great impact on the organized systems for handling scientific and technical information. The volume of literature is growing

so rapidly that no one scientist or researcher can be aware of more than a small portion of it. One result is greater specialization on the part of scientists. One can hope that library would give adequate service in response to highly specialized demands and for which new forms have evolved in the information centres and host of informal mechanisms. But it is fully realized that without integration and close cooperation, all these resources will remain a series of separate, insulated institutions and if maximum communication should be established among them, which can be converted into a national resources of immense value to citizens throughout the country. [100]

In the United States the scientific and technical organization are existed in both federal and non-federal sectors. These categories, as well as the assignment of an organization to any one category, are somewhat arbitrary.

The Federal Sector:

A large number of organizations with significant scientific and technical information activities are included in the federal sector. Most of the federal organizations of

interest to national system design and planning have been placed under the executive branch. The executive branch exercises no direct control over their operations, but both act in cooperation with executive departments.

The Library of Congress is the largest and most important library in the United States, both in size and of services. Its services are being utilized by the entire governmental establishment as well as the public at large. A survey reveals that its collection contain more than 43 million items, of which more than 13 million are books, serials and pamphlets covering all fields of knowledge [104]

The activities of the Government Printing Office (GPO) of the USA is also considered the book store of the federal government. It has been taken from an annual pay roll where more than 6000 employees produced more than 41 million catalogue cards for the Library of Congress.

The Executive :

The executive branch is divided into two parts. The first of these are agencies and organizations in the executive office of the President and the other one is the executive departments and independent agencies. The

executive office of the President is concerned with administration and policy and the executive departments and independent agencies contain the operating agencies for handling documents and information.

The executive office of the US President comprises the Office of Science and Technology (OST), Bureau of the Budget (BOB), and the National Security Council which includes the Central Intelligence Agency (CIA). Besides, there are two advisory committees [102] :

1. PSAC (President's Science Advisory Committee); and
2. FCST (Federal Council on Science and Technology).

The CIA does not resemble the typical executive office operation in that, with respect to documentation and information handling, it is an operating agency rather than an administrative or policy-setting agency. The Executive Office formulates policy and prepare planning in respect to the national information system. On the other hand BOB has responsibility for reviewing the estimated cost of any plans and the OST is a policy organization responsive to the advisory organizations, PSAC and FCST. PSAC is composed of eminent non-government scientists and FCST is

constituted by the government science administrators. PSAC acts directly through its special panels, whereas FCST is assisted by the Committee on Scientific and Technical Information (COSATI) in planning and advising with respect to information system requirements and developments. [103]

Agriculture :

The national agricultural library of the USA is under the control of the Department of Agriculture. National Agricultural Library is responsible for coordination of documentation and library activities there, collecting all significant material in agriculture and related fields and issues basic bibliographies. All the publication and distribution is being done by the office of information.

[104] The Atomic Energy Commission (AEC) includes a general manager to whom the Division of Technical Information (DTI) reports to him, and is the major entity in AEC of the USA concerned with scientific and technical information. The Atomic Energy has its own directorates, whose services include publishing Nuclear Science Abstracts.

The Patent Office, the National Bureau of standards and the US Coast and Geodetic Survey, all these three departments are under the control of the Department of Commerce. The US Patent Office is the repository for all patents granted by the federal government. The patents are announced through the weekly Gazette and also sells copies of patents.

In the National Bureau of standards the institute for applied technology acts as a Clearinghouse for Federal Scientific and Technical Information (CFSTI). It is responsible for publishing and distributing all the unclassified or otherwise unrestricted S & T material produced by the government and its contractors in science and technology.

The U S Coast and Geodetic Survey operates basically as an information analysis centre, it also functions as a library and repository in those areas of interest to the agency.

Department of Defence :

In America the Department of Defence consists many organizations of interest to a national information

system. There are two generators and users of documents (1) The National Security Agency (NSA); and (2) The Defence Intelligence Agency (DIA). These two important agencies having their own internal libraries are performing certain analytical services of special nature and restricted to the general audiences. The Defence Supply Agency (DSA) is the administrative agency for the Defence Documentation Centre (DDC).

The Department of Health: [105]

It has been found that there are three organizations namely:

1. Office of Education;
2. The Public Health Service; and
3. The Food and Drug Administration.

The Food and Drug Administration generates many documents and operates several information analysis centres. The Public Health includes the National Institutes of Health (NIH), the National Library of Medicine (NLM) and field installations. The selected field installations are of interest for their relation to the

community of users and the fact that they operate information analysis centres. The National Institute of Health also contains information analysis centres. The National Library of Medicine of USA, publishes the Index Medicus which covers most of the medical journals and literature produced in the United States. The National Medical Library and its system represents one of the more advanced applications of computer technology in the field of subject index distribution to large audiences.

The National Science Foundation, includes the office of Science Information service (OSIS) which supports research and sponsors journals and other ventures in the area of documentation. There is another International Exchange Service (IES) within the Smithsonian Institution which is the focal point in the federal sector for the exchange of documents with other countries.

The Non-federal Sector:

The organisations of science and technology in the non-federal sector in the USA, are more or less functionally similar to those that exist in the federal sector, but

their purposes, methods and structure etc. differ to considerable degree. The organizations among themselves also differ in the degree to which they depend on the federal sector for assistance. It is also observed that there is no central line authority in the non-federal sector, which exists in the federal sector. [106]

In non-federal sector there are two groups of libraries of significance with respect to scientific and technical documents and information. These are university libraries and the larger public libraries. Non-federal libraries are a prime source of government-produced or distributed documentation and information for the many scientists, scholars, and others who do not have access to much of the federal system. [107]

Libraries :

A survey was conducted which revealed that 17,000 libraries [108] exists in the United States and Canada. The total library budget for that year was \$ 900 million and there were 70,000 qualified professional librarians of whom only 5 per cent were engaged by the federal sector. The libraries has been categorized as:

1. Public Libraries ;
2. Academic Libraries;
3. Special Libraries;
4. National Libraries ; and
5. Departmental and agency libraries

Public libraries to include those libraries that are founded by private or foundation funds, municipal funds or other non-federal monies. Academic libraries are those libraries, that are part of colleges and universities. Special libraries include business and industrial libraries not a part of the federal system. National libraries include the Library of Congress, the National Agricultural Library and the National Library of Medicine. Departmental and agency libraries include all other federally supported libraries.

Information Centres:

There are more than 300 information centres in the federal sector [109] and was many if not more in the private sector. These organizations perform specific, special-purpose analytical works. Typical products of

information centres are analytical reports written by subject area specialists in the centres' staff and specially manipulated data summary reports prepared through manual or automated producers by the information centres.

The recent growth of information centres has resulted from the apparent inability of conventional library systems to serve the needs of the user groups. Information centres differ from libraries in three basic characteristics:

1. Active acquisition of documents judged to be relevant to the mission of the users;
2. Limited subject fields allowing greater depths in the indexing vocabulary for more specialized searches and exploitation; and
3. Rapid response to the user needs both in terms of updating the collection being exploited and in terms of providing mission-oriented services.

The activities of the information centres in the federal sector tend to serve a specialized field of interest rather than a prescribed user group. The output therefore is not tailored to a user expression of need but rather to the generalized mission of comprehensive analysis and need. In contrast private information centres tend to be more directly user oriented. Among the

information centres operated private organizations may be cited the Smith, Kline, and French (SKF) Laboratories like many of the drug, chemical, and petroleum industry organizations. SKF Laboratories have determined that commercial competition is enhanced by adequate internal information services.

It has been found that there are fifteen information data centres in the federal sector which are supported by the Atomic Energy Commission (AEC). The Department of Commerce operates three data centres in the Coast and Geodetic Survey and through the National Standards Reference Data Centre, supports data evaluation activities at universities. Department of Defense maintains a comprehensive catalogue of the approximately 300 data and information centres in Department of Defense. The following are larger among them: [110]

1. Defense Atomic Support Agency Data Centre, in Santa Barbara;
2. Ceramic and Graphite Information Centre, at the Air Force Materials Laboratory;
3. Thermophysical Properties Research Centre, at Purdue University;
4. Defense Metals Information Centre at Battelle Memorial Institute;
5. Shock and Vibration Information Centre, at the Naval Research Laboratory in Washington;

6. Counterinsurgency Information and Analysis Centre, at the American University;
7. Human Engineering Information and Analysis Service, at Tufts University;
8. Military Entomology Service, at Walter Reed Medical Centre.
9. Coastal Engineering Information and Evaluation Centre; and
10. Plastics Technical Evaluation Centre.

The Department of Health, Education, and Welfare estimates that it supports more than fifty information evaluation centres. The majority of these are operated internally and range from a single individual to organizations with extensive bibliographic resources. The Food and Drug Administration is setting up a comprehensive, machine-oriented information analysis system.

In the United States there exists a loosely coordinated set of organizations and activities that constitutes a de-facto scientific and technical information system. Libraries and information community in the United States is composed of many independent autonomous units in the Public and Private Sector. Units supported by tax funds are in the public sector. Others belong to the private Sector. Regardless of sector, each library

has its own primary clientele, its own financial base, and its own jurisdictional sphere of action. As a group they constitute a pluralistic society of independent activities that form the information infrastructure of the United States.

In 1967, President Johnson in two occasions urged the integration of modern communication with library and information practices at the Conference on World Education in Williamsburg, Virginia, where he stated the need for providing the best library facilities in the world through exploitation of communication technology [111] In another occasion on 7th November, 1967 President signed into law the Public Broadcasting act, he remarked as " I think we must consider new ways to build a great network for knowledge -- not just a broadcast systems, but one that employs every means of sending and storing information that the individual can use". [112]

The President has taken keen interest which is resulted in the appointment of Eugene V Restow of the State Department to head a one year commission, and charged with the responsibility of conducting a comprehensive review of United States telecommunication policy.

The Congress has passed a bill entitled the Higher Education Act of 1968 [113], including a separate section on networks known as Title IX - Networks for knowledge. Title IX has provisions designed to encourage and further joint programmes among institutions of higher learning for the cooperative exploration of the new computer and communications technologies. The Department of Health, Education, and Welfare stated that the National Library of Medicine would continue to serve as the Department's vital Centre for health communications and related scientific development. [114]

In the U S A, other national developments were also demanding for expanded library service and at the same time talked for establishment of information networks among them, the worth mentioning were the state technical services Act, the National Library of Medicine's programme for regional medical libraries, the Regional Medical Programme for Heart Disease, Cancer and Stroke, the office of Education's support of libraries the joint programme of the Library of Congress, the National Library of Medicine, and the National Agricultural Library for development of machine-readable catalogue data for monographs and serials, and the supporting programmes of the National Science Foundation. It became apparent in the year 1967 to the National Science Foundation that the

developing discipline - oriented information systems to the professional societies, the mission- oriented systems in the Federal agencies and the private institutions and organizations with their specialized information systems would require same kind of coordination and eventual integration into a national information network.

[115]

From 1963 to 1969, two important reports on scientific and technical information dealing with the national problems of information handling and organization have taken place in the USA. The Government of USA has shown the interest in the information services taking initiative to bring about a coordinated system appointing the Weinberg Panel in 1963. The second report of the committee on scientific and technical communication (SATCOM) in 1969 of the Academies of Sciences and Engineering, represents the effort of the Scientific and technical community for coordinating the activities of both the federal and non-federal sectors and to establish a base for a national system of information services.

It is also well known fact that national concern for rapid and efficient systems of communication which is

regarded as the key factor to the national progress of science and technology became more and more important in the decades following the Second World War and more emphasis has been given in scientific information in 1957 when the Soviet Union launched its first satellite and since then, information activities have been continually expanding. And from this time the Govt. of USA increased the R & D expenditure i.e. in 1967 the country spent \$ 27 billion on R & D and \$ 5 billion on information as against \$ 20 million and 1.5 to 2% of this in the year 1965 respectively. [116]

The essence of strengthening the present systems lies in strengthening the cooperative efforts between several federal organizations, each of which has a defined role in science and technology and an established interface with the scientific and technological community as a whole. These organizations are the following: [117]

1. The Office of Science and Technology (OST)
2. The Federal Council for Science and Technology (FCST)
3. National Academy of Sciences- National Research Council (NAS - NRC) and
4. The National Science Foundation (NSF).

The concept requires that these organizations

recognize and accept both a responsibility for and leadership in developing policies and plans for a coordinated national scientific and technical document and information handling system.

Establishment of OST :

The two organs of the Congress of the USA has taken keen interest in the development of information system which is the key factor to the National progress of science and technology of the country and as such several study committees were appointed during the last two decades. Mention may be made of the Senate Subcommittee on information headed by Senator Hubert H Humphrey and this committee worked through the years 1957 and 1960. Though this committee could not accomplish much by way of legislative action, but the studies resulted in the establishment of the office of Science and Technology (OST). The Office of Science and Technology is best suited to assume overall cognizance of and policy development for a national system for S & T document and information handling. Its knowledge

of federal government long-range planning for scientific and technological efforts and its organizational placement in the Executive Office of the President make it a rational choice for this responsibility. Its authority in this area is already established by Reorganization Plan No.2 of March 27,1962. The Plan states in part, that OST will...

"... advise and assist the President as the President may request with respect to ... Review, integration and coordination of major Federal activities in Science and technology, giving due consideration to the effects of such activities on non-federal resources and institutions. OST as the Focal point assuring good and close relations exist with the Nation's Scientific and engineering communities so as to further in every appropriate way their participation in strengthening Science and technology in the United States and the Free World..." [118]

OST, by expanding existing relationships with FCST and NAS-NRC, would be afforded advice and support from both federal and non-federal S & T document and information handling organizations. NSF would be the supporting organization performing a multitude of tasks delegated to it by OST. And in this period the other organ of the Congress, the House of Representatives also given serious thought to the problems of information services and among the several steps, the bill proposed by Representative Roman C Pucinski in 1969 for a National

Science Research Data. Processing and information Retrieval systems.

Executive Actions :

The Congress of the USA was considering the ways and means to develop a national information system and the Executive branch of the Federal Government was also stimulating the development of a number of National Plans for Scientific and technical information. And a panel was constituted under the President's Science Advisory Committee in 1958 (PSAC) to make a study in information activities in the country. In the same year the National Defence Education Act was also passed incorporating the recommendations of the PSAC provided for the creation of the office of Science Information Service (OSIS) in the National Science Foundation. The National Science Foundation being a new office set a programme for active and well support to the development in information services. In 1962 the President's Science Advisory Committee appointed a panel [119] headed by Alvin M Weinberg and a small task group chaired by J A Crawford to make a report of the information services in the

country. However, in these two panel, the Crawford Task Group, completing the work submitted the recommendations for the establishment of separate centres in the federal agencies for taking responsibility of the information services and as such the Department of Defence (DOD), Atomic Energy Commission (AEC) , National Aeronautics and also Space Administration (NASA) were established in the federal agencies.

Weinberg Report :

The most significant report in the history of scientific and technical communication in the USA was the Weinberg Report of 1963 [120] which highlighted the crucial importance of information as a basic requirement for R & D. This report emphasized that the entire information process must be made an integral part of research and development and also insisted that the various steps in the information transfer were also a part of the responsibilities of the organizations engaged in or cooperated with the creation of the information. The working scientists as well as other creators of

information should, therefore partake in the access services by providing keywords for articles or by preparing abstracts, etc. The reviewing function which needs recasting, critical analysis and synthesis of current findings, should be given more attention and that those who are engaged in the task must be rewarded adequately in terms of recognition and remuneration. Further the committee recognized that the technical information centres which are fulfilling the needs of specific areas of knowledge, should be given proper recognition and all possible support. The Federal council for science and technology was the suggested mechanism for keeping the network of governmental systems under control and supervision. However, the panel has given emphasized on non-governmental agencies offering efficient information services. Above all this report made known wide interest not only in the United States but in other parts of the world. The Government of the USA being satisfied with the recommendations of the Weinberg Panel, established the committee on Scientific and Technical Information (COSATI)) under the Federal Council for Science and Technology (FCST) has been trying hard to solve the network interface problems of the Federal Agencies and in addition, established a sub-committee in

1967 to work exclusively on the development of a national system. [121]

The Committee on Scientific and Technical Information from its very inception operates through seven standing panels and a number of ad-hoc task groups. The seven standing panels which are tackled by COSATI were as follows :

1. Operational techniques and system.
2. Information Sciences and Technology
3. Education and Training
4. International Information Activities
5. Management of Information Activities.
6. Information Analysis and Data Centres.
7. Legal aspects involved in National Information Systems.

The COSATI tried to introducing standard procedures and greater co-ordination of efforts among the scientific and technical communication of federal agencies of the USA. The National Academy of Sciences and the National Academy of Engineering jointly established a Committee on Scientific and Technical Communication. The Committee will provide a focus for participation by scientists and

engineers through their societies in consideration of plans for a national network of information systems in Science and Technology as proposed by the Committee on Scientific and Technical Information (COSATI) of the Federal Council for Science and Technology.

In its study of the present status and future requirements of the national scientific and engineering communities with respect to the flow and transfer of scientific and technical information, the committee expects to work closely with COSATI, the office of Science Information Service of the National Science Foundation, the office of Science and Technology in the Executive Office of the President, and with professional groups that perform information services and special attention would be given to non-governmental information activities and to the interactions and interrelations between government and the Private sector in Science information .

[122] - COSATI would continue to exploit the skills of the personnel of the various agencies for support of study efforts. It was also suggested that COSATI could be additionally supported by a small permanent staff to assist in its efforts in formulating policy, recommendations, developing requests for action and providing group responses to proposed policies for the Federal sector. [123]

Licklider Panel :

In 1964 the office of Science and Technology of the USA appointed again a special panel chaired by JCR Licklider to examine and assessment the situation of the country's scientific and technical communication. This time, the panel revealed that government efforts in persuading the scientific community to cooperate and integrate the public and private services into a unified systems had little success. The committee on the otherhand emphasized the need for centralizing certain functions such as overall planning, monitering compatibility, and developing standards and decentralizing others such as abstracting, indexing, reviewing etc. [124] Apart from these, a multitude of different systems were developing inside and outside the government, the National Bureau of Standards has started the programmes for standardizing formats for textual numerical data exchanged through computers and communications. It has been noticed that the White House established a special Task Force, Office of Science and Technology with cooperation of the National Academy of Sciences for the Interchange of Scientific and Technical Information in Machine Language(ISTIM).

[125]

Establishment of SATCOM : (Committee on Scientific and Technical Communication)

COSATI have been designed for introducing standards procedures and also trying hard to solve the network interface problems of the Federal Agencies, Specific implementation was left to the uncoordinated judgement of many diverse individuals and organizations. There was nothing analogous to COSATI to coordinate the diverse activities of the private sector. And it was felt greatly for the establishment of a non-federal body for facilitate coordinated planning in the Private sector also. And the National Science Foundation having consulted with the office of Science and Technology and with COSATI placed proposed to the Academy of Sciences and the Academy of Engineering for the assessment of the information activities in the country in greater detail. However, the Academies of its prestigious value and non-governmental status and it has close working links with federal agencies, private organizations and scientists of the country, responded to the proposal and which was the resulted of the establishment of the committee on scientific and Technical Communications (SATCOM) in February 1966. [126]

Now, SATCOM came into being in USA and one of the

primary functions of this group is to improve methods for promoting effective relationships between information systems and principal producers and users of scientific and technical information, and also to stimulate the application of new techniques and systems for information transfer. SATCOM was composed of the representatives from the various segment of non-federal society like major Scientific and technical fields, Libraries, Universities, Publishers, and Industry. * The membership included a wide range of interests and types of expertise on Scientific and technical information activities to assure insights, awareness of the implications of new technologies and sensibility to the information problems and needs of the everyday working scientists, engineer and practitioner."

[127]

According to the National Academy of the USA the terms of reference to the Committee were as follows:

- * The Committee will give special attention to (1) Information activities, policies and relationships, interrelating the groups and organization of the private sector and (2) Interaction and interrelationship between the federal government and the private sector in connection with Scientific and technical information, especially federal executive or legislative action or operations

that affect substantial portion of the private sector, with a view to making recommendations to the organizations and individuals of the private sector, as well as to the federal government. The Committee will also consider, particularly (but not exclusively) in the light of the overall problem:

1. Methods for promoting more effective relationship between information systems and Scientists and engineers, the principal producers and users of scientific and technical information;
2. Techniques and systems for facilitating the effectiveness of information transfer; and
3. Needs for new means of providing greater selectivity and consolidation in information transfer.

The SATCOM final report was submitted in June, 1969.* [128]

Objectives of SATCOM:

The objective of SATCOM was to create and strengthen existing pluralistic and decentralized complex of

information services by fostering greater cooperation and coordination among its diverse components. For achieving these objectives, the following principles were developed:

1. Information services should be responsive to user needs and must have the flexibility to adapt rapidly to changes.
2. Authority for organization must be distributed as opposed to the creation of a monolithic centralized one.
3. Planning of information activities must involve constant attention to simplification and consolidation of existing knowledge and must be reprocessed to fit the exact user needs.

Besides, SATCOM gave attention first on the central issue of creating a suitable mechanism for coordinated planning. It recommended the establishment of a permanent commission on Scientific and technical communication for stimulating greater coordination among Private groups and bringing them into close touch with government agencies. The permanent SATCOM would be responsible to the National Academies of Sciences and Engineering. The permanent SATCOM could fulfil the following required conditions:

1. They would afford ready access to maximum knowledge and expertise in Science and Technology;
2. They would ensure broad representation of the organizations, groups and individuals whose efforts depend upon and influence scientific and technical communication;
3. They would facilitate the desired type of interaction with the federal government; and
4. They represent a longstanding tradition of diversified and intensive involvement in Scientific and technical communication activities. [129]

In USA all the information mentioned earlier is a brief sketch of the information activities prevailing within the Federal structure and the private sector in support of information network concept. Besides there are networks exist at the state level also. Many states were readying network plans under Title III of the Library Services and construction Act. And networks for teletype and telefacsimile has received greater attention and at the sametime, there were also signs of affiliation and amalgamation at the local level due to availability of the MARC (Machine Readable Catalogue) computer tapes from the Library of Congress. MARC tapes are certain to have a consolidating effect on technical processing, particularly among public and school libraries. [130]

During the last 15 years the concept of library networks has developed in the United States of America and there are three types of library networks :

1. Organizational networks;
2. Specialized networks and
3. Functional networks.

The history of information networks may be traced back to the time when librarians first recognized the benefits of inter-library cooperation. It has been seen that in 1853 a meeting of librarians was held in New York city, where Monsieur A Vattlemare described the usefulness of the international library cooperation among libraries. He also discussed for a " permanent system of bibliographic exchange between governments, a central agency on each continent in connection with each other to negotiate these exchanges and the value of union lists." [131]

However, networking is only an extension of traditional forms of inter-library co-operation; it transforms a loose confederation of library collections or information systems into a formal, integrated organizational structure whose potential for rendering service is greater than the sum of its parts. [132]

The American Library Community has been on a steady course towards increased inter-library co-operation, co-operative efforts among libraries date back to the 1920s when library consortia were organized. [133] These inter-institutional alliances were first formed among academic institutions to network building in the United States and the Interuniversity Communication Council (EDUCOM) was being a voluntary consortium of educational institutions whose function is to facilitate the extra organizational communication of a university.

By 1934, a study was conducted by Danial Sanford which revealed that 113 active library consortia in the United States and from that point, co-operative agreements among group of libraries of all types and today virtually thousands of 'co-operatives, consortia, systems; and networks, of all kinds exist across the land. While co-operation agreements among libraries have existed for decades, the concept of library networks developed only within the last 8-10 years. [134]

Organizational Networks:

Many inter-state networks like those in Illinois

and New York built on existing public library systems, in the state. State legislation is required as the formal base for organizing the public library into a common network, but latter the state library itself plays an important role as planner manager and network developer. Examples of these interstate groupings are: NETINET (the New England Library Network) in the North-east; SLICE (South-eastern Library Interstate Co-operative Endeavour) and SOLINET (South-eastern Library Networks) and many others.

Specialized Networks:

The Medical Library Network in the United States, under the aegis of the National Library of Medicine falls into the category of specialized Networks of Libraries. Specialized networks limit their domain of coverage to the literature of a specific subject field. Similar networks like agriculture and astronautics are also specialized type of networks in USA.

Functional Networks :

The Ohio College Library Centre (OCLC) of USA

being a non-profit making organization chartered as a Corporation by the state of Ohio. This centre was established to serve academic libraries in Ohio. But later on with the availability of computer services, Public libraries and regional libraries were also added as its members which made this Centre more important. The OCLC network consists of a large central computer configuration with a direct access. This computer facility is connected to member libraries through conventional telephone communication channels. Using a special cathode-ray tube terminal designed for OCLC, each member is able to communicate with the central store of bibliographic records in the direct access memory. [135] Basically OCLC has compiled a giant Union catalogue of the holdings of its member libraries. This Centre is planning a useful sub-systems such as on-line serial control, On-line technical processing and On-line inter-library loan module.

Another local network which may be mentioned here is the Washington Library Network (WLN) is for the use of the libraries of the state of Washington. The plans of Washington state to transform the pacific northwest bibliographic centre into the WLN computerized bibliographic services have been described by Mary Jane Reed. [136]

BALLOTS is the non-line support system for the acquisition and cataloguing activities of the Stanford University Libraries. It is currently being pilot tested for external use by several large public libraries and University Libraries of California. It also performed computer based information activities like that of OCLC.

OCLC, BALLOTS and WLN are all computerized cooperatives state Network system in USA. OCLC has more members and has been operational is the only one with nation-wide geographic coverage and it has been cited by some as the most developed national network system in the USA. [137] Now from the above statements it becomes clear that the development of a national information system is a complex and at the sametime difficult consists of a multiplicity of problems and it cannot be worked out overnight. A nationwide network of information systems connecting local, state, regional and national resources in the US will involve highly complex system design, the utmost technical skill, and above all a sense of purpose and commitment on the part of all those concerned with effort.

The US Government can and should play a key role in preparing such a plan. It will probably continue to be one of the major influences on information network

development, setting a pattern for others to follow. It may create its own information networks in specialized fields, such as medicine, agriculture, or it may make funds available to the private sector in order to facilitate regional development.

In the United States, access to information is a public right. But, a rapidly increasing population and a rapidly expanding universe of information are introducing constraints and preventing the public from freely exercising this right. [138] The object is to remove these impediments to knowledge by developing information networks/systems that will accelerate communication of information in all forms on a national basis in USA. National planning of library networks has emerged therefore as a priority United States objective.

IV

NATIONAL INFORMATION ACTIVITIES :USSR

Documentation, Information and Library System has been taking long steps in USSR. The Academy of science having realized the need for exhaustive information services to feed the research workers and scientists of the Soviet Union, emphasized greatly on the scientific development which resulted in the establishment of VINITI in USSR (All Union Institute for Scientific and Technical Information). It is the national conditions and prerequisites i.e., the socio-economic situation, that govern the establishment and organization of a national documentation and information system. [139] The level of information interconnexion and the volume of information requirements depend on the level of social and economic development. In the words of Dr Ranganathan

" Documentation has taken great strides in USSR during the last few years. The Presidium of the Academy of Sciences realized the need for exhaustive, expeditious, and pin-pointed documentation to feed the research work and to conserve the research potential of the country. Therefore it established the VINITI (All-Union Institute for Scientific and Technical Information) in 1952 and VINITI went into service in 1953". [140]

He further opined that probably the most valuable fixed

assets of any information system are the information stores, where most of the potentially available knowledge is collected ordered, stored and preferred retrieval.

" The effective use of scientific and technological information of today's society is of paramount importance and has therefore become a subject which is receiving world wide attention." [141]

It is evident that in the USSR, strong impetus was given to the development of libraries following the adoption in 1959 by the Central Committee of the Communist Party of the Soviet Union (CPSU) of the resolution on conditions and measures for improving library and information services in the country. It has also been noticed that between 1960 and 1974 some 40,000 new libraries were established throughout the country and in this period, books and periodicals also increased by approximately 15,000 million volumes, the number of librarians rose by 50 percent, library attendance rose by, more than 60 million and the number of books issued by 15000 million. [142]

The progress which has been achieved in the USSR, has been based on the socio-economic development and on principle of organizing information system, which are

unique to all other countries of the world. The institutions which have been established in the USSR, have been described as :

" the easiest and most economical way to achieve the maximum coverage of world information resources in different areas of knowledge, to correlate and synthesize the material broadest far afield". [143]

Technical and scientific information has received national priority in USSR and for the advancement and improvement of information activity in the Soviet Union, the Council of Ministers and its committee emphasized greatly and it was promulgated on January 1, 1967 that all the scientific publication in Soviet Union would have to be provided with an abstract, together with UDC number will give a summary of the contents etc. It is considered that there is very extensive scientific publications that a single publishing house, Nauka annually publishes more than 750,000 pages and VINITI, 481,000 pages; and that the publishing houses of the Academy of Sciences , produce 17,60,000 pages each year.

It can be seen that there are many advantages to the systematic provision of abstracts. In the field of Science, the reader in Soviet Union is offered approximately 3,000,000 printed pages annually. An average

book comprises about 250 pages so this means an annual production of 12,000 scientific books. With a total book production in the Soviet Union of 50,000 titles annually, the validity of 'publish or perish' is indeed evident. [144] The basic to the organization of the information services of the Soviet Union is the principle of centralized processing of publications.

There were over 16,600 public Libraries in Soviet republics, when USSR was founded in 1922 including 3,726 in the Ukraine, 394 in Byelorussia, 150 in Kazakhstan, 138 in Georgia, 80 in Armenia, 65 in Azerbaijan etc. [145] At the beginning of the First World War, in USSR there were 13,876 public libraries with an overall stock of 9,442,000 books and journals which meant that for every 100 inhabitants there were 7 books and journals in the Russian Federation, 6 in Byelorussia, 5 in the Ukraine, Latvia and Estonia, 3 in Moddavia, 2 in Kazakhstan and 1 in Georgia, Armenia, Azerbaijan and Lithuania. There were no public libraries at all in Uzbekistan, Kirghizia, Tadzhikistan or Turkmenia. [146] By the beginning of 1971 there were three times the number of public libraries than there were in 1945 with a book stock twelve times as large, but pre-revolutionary Russia was the "Prison of the people" said by Lenin, [147] as that time the various

nations and peoples living in Russia were culturally not developed, and it is said that 4000 years have been taken for the indigenous people of the outlying parts of the country to achieve universal literacy.

In another article [148] it has been found that there are 360,000 libraries in USSR, which include 128,000 general lending libraries and approximately 60,000 scientific and specialized libraries with holdings 3700 million volumes and an annual readership of more than 180 million, extend their services to the majority of industrial enterprises as well as to every centre of population. The development of library activity has been specially marked in Moscow and Leningrad, in the Ukraine, Byelorussia, Georgia, Moldavia, Latvia and Kirghizia in the Buryat and Mari A.S.S.R's. in the Krasnodar, Krasnojarsk and Khabarovsk territories and in the Gorky, Sverdlovsk, Novosibirsk, Kamchatka and other regions of the R.S.F.S.R.

Greater emphasis has been given by the USSR to reinforce the material and technical infrastructure, with the construction of more than 50,000 new library buildings including premises for major national, republic or regional libraries and other large libraries

attached to academies or Universities e.g., a public scientific and technical library to have 10 million volumes in Novosibirsk, the Central Agricultural Library, the Fundamental Library of Social Sciences and the All-Union Library of Foreign literature (each housing 5 million volumes). The Republic library of Kazakhstan (4 million volumes) and the Republic Libraries of Kirghizia, Mołdavia, Lithuania and Azerbaijan (2 million volumes each). At the same time it has been noticed also that more than 60 regional libraries and a large number of academy, University and scientific libraries have been provided with new buildings having capacity of keeping 50,000 to a million volumes. [149]

T S Rajagopalan (of INSDOC) in one of his articles [150] has said that scientific information received due attention from the early years of Soviet rule, and a decree was adopted at the initiative of Vladimir Iljits Lenin for the procurement and evaluate of foreign literature and as such a central committee on procurement for foreign literature was established with the task of ensuring that at least one copy of all the foreign literature of science and technology is received in some of the major libraries. The name of this organization was (KOMINOLIT) which is the pioneer organization for the activities of science and

technology in Soviet Russia.

The Soviet government having realized the urgency of the information for science and technology began establishing information systems in various branches of government and industry because of the increasing demand for the science literature in various areas of research and development, but the National system developed at an exponential rate after 1945 [151] when the scientific and technical literature increased enormously.

The Bureau of Foreign Science and Technology (BINT) (Buro Inostrannoi Nauki i Tekhniki) being established in 1921, brought out an abstract journal Directory of Technical Literature and in a short time it had collected information about 5,00,000 publications. [152] At this time a reference journal Information on Scientific and Technical Works in the Republic (Sobshchenia o Nauchnotekhnicheskikh Rabotakh v Respublike) was also started and published from 1920-1932. [153] In another article Benjamin L Kirson said that the Soviet government had established the Central Interdepartmental Commission in 1921 for the acquisition and distribution of foreign literature, which was the first step towards the creation of a national central scientific and technical information systems and this

national system developed at an exponential rate after 1945 when the Soviet authority began establishing information systems in various branches of government and industry. [154]

The USSR realized that scientific and technical progress depends upon a well organized system of information, and as such Mr Kosygin once told the 23rd Party Congress that "information is a national resource". Technical progress is the national economy and the success of Science depend in great measure on a well-organized system of information." [155] At this time there were about 110,000 workers in the Soviet Science Information Service, and its costs direct and indirect, were once estimated at 20 percent of Science expenditure.

Technical progress was the main theme of the Soviet Union which is evident from one standard quotation from Lenin which can be translated as -

* the economist who doesn't look at the way technology is going soon finds himself out of a job* [156]

The official recognition of the crises in technological innovation in October 1968 decree entitled, "Measures for increasing the efficiency of Research Organization and accelerating the use of the achievements of science

and Technology in the National Economy." Further the volume of information about the Russian economy is described as expanding as the square and sometimes as the cube of the expansion of the volume of production. Viktor Glushkov of the Ukrainian Academy remarked in 1964, when there were 10 million in the management apparatus, that the preservation of the existing systems until 1980 would require the employment of the entire adult population. [157]

The February 1970 meeting of the Academy of Sciences heard T S Khachaturov , who heads the scientific council on optimizing the national economy, report on his preliminary forecast of development until 1990. He schedules the electrification of the national economy as the main area of technical progress, so new investment in electrical energy sources will exceed that for industry. [158]

During the industrial development and collectivization of agriculture in the Soviet Union, measures were also taken by the government for further gear up the scientific and technical information services at this time a year book Scientific literature of the USSR began to be published from 1928-1935 which had covered

social and natural science, Agriculture, Technical Literature including Medicine. A monthly bulletin News of Technical Literature was also published providing current bibliographical information which lasted from 1924 to 1930 and a technical card catalogue (Novosti Tekhnicheskoi Literature) which was from 1929-1953. [159]

In the year 1931 the central committee of the Communist Party gave emphasis taking a resolution for the organising on industrial engineering surveying foreign literature particularly are technical advancement and as such institutes of sciences tried to published abstract journals under the title For Mastering Techniques [160] (Zaovladienie Tekhnikei) by this time arrangements were made to publish a number of abstracting journals, reviews such as Chemical Abstracts Journal (Khimiches Kii Referativnyi journal), Review of energetics and building industry (Stroiuindustria). A large number of review journals were also published during 1933 to 1938 such as World Technology [161] which deals with metallurgy and mechanical engineering, News on Petroleum Technology and News on Foreign Metallurgy, all these journals carried reviews and translations of important foreign literature upto 1938. The Soviet Government has given keen interest of the organization and development of Central Reference

Service and for the improvement of the Library Services and Bibliography a conference was held in 1936 and in the same year the responsibility for disseminating science and technological information was given to the state science library which published a monthly journal News on Technical literature from 1936 and it continued upto 1953. This bulletin was issued in six series: [162]

1. Mining Industry, Metallurgy;
2. Metal Technology;
3. Mechanical Engineering;
4. Building Industry;
5. Chemistry and Chemical Industry; and
6. Energetic and Electrical Industry.

The coverage of this journal included all the Russian material including 15,000 foreign technical journals and unpublished works of the institutes of science and technology. The most important works were being published by the Academy of Sciences, USSR.

1. Physical and Mathematical Abstracts; and
2. Chemistry Abstracting Journal in the year 1938 to 1941. [163]

The advancement in science and technology which have been achieved in Soviet Russia were based on the development of an economic system and on principles of organizing information which are unique to the countries of the Soviet world. In view of the increasing tempo of scientific and technological activities, it became necessary to create a network of information institutes in the different fields of science and technology.

" The network of information services have been established not only by setting up new institutes and developments but by re-organizing traditional scientific, university, technical and other specialized libraries and adopting them to new forms of activity and new working methods. As a result these libraries have been incorporated into newly established institutes and developments. In some cases they have continued to exist independently, bringing their work into line with information establishments working in similar fields or providing a science and technical information service in research institutes, universities and firms. [164]

Even the rapid growth in scientific and technical literature and the increased demand for this literature in various areas of research and developments, this network of information institutes was not sufficient and in solving this problem, the need for more sophisticated technical information systems became apparent. The

Academy of Sciences of USSR established the Institute of Scientific Information in 1952 within the frame work of the USSR. The academic sciences, the Council of Ministers of the USSR recognized the Institute of Scientific Information into the All-Union Institute of Scientific and Technological Information (VINITI) in 1955 [165] (Vsesoiuznyi Institut Nauchnoi i Tekhnicheskoi Informatsii). VINITI was also given the status of the principal information organ of the country. Dr S R Ranganathan after attending the 25th Conference of the International Federation for Documentation held in Warsaw in September 1959 had the opportunity to stay in Moscow when he studied the organization and working of VINITI, at first sight. He could not believe that as many as 1800 persons were working there. [166] From the very inception VINITI planned to make a universal coverage of articles, books and reviews of all kinds and standards. Dr Ranganathan was impressed with the National Documentation Centre of the USSR founded in 1953. Its activities include abstracting work covering 3000 Soviet periodicals and 11,000 foreign periodicals published in 80 languages [167] including 15 Soviet languages and 4000 other publication were being abstracted. Since its beginning, VINITI has developed into one of the largest technical

information centres in the world. It has at present a staff of about 35000 persons, about 1500 persons are engaged in primary and publishing work [168] others are distributed among the preliminary processing departments various editorial and abstracting departments, translation department, automation department and methodology department.

In an editorial [169] it has been stated that more than 1,00,000 persons are employed in Soviet Information Institutes and Centres. The literature coverage of VINITI'S Referativny Zhurnal rose to 6,000 Soviet and 17000 foreign periodicals and serials, 9200 patents, as well as other literature from 102 countries.

In another article, [170] it has been stated that since the establishment of VINITI, it has been developed into one of the largest technical information Centres in the World and it has been estimated that VINITI has 2500 full time scientists and over 2200 outside scientists and technical people for providing abstracting and editing services. Each year since 1966 VINITI receives more than 20,000 publications over 100 different countries, out of which it extracts and abstracts nearly 67000 articles, covering literature of Natural Sciences, technical sciences also includes economics.

The Soviet S & T information system consists solely of the centralized VINITI, the Pucinski Committee's report points out that the "Network consists of 84 National-level organizations these includes ten specialized information institutes (e.g., the All-Union Scientific Research Institute of Technical-Economic Information of Radio-electronics), 94 regional bureaus of technical information at the Sovnarkhozes (economic units based on regional administration), over 4000 bureaus of technical information at research institutes and production facilities and more than 16,000 technical libraries [171] There is a widespread impression in the world that the VINITI constitutes the entire Soviet S & T information system, that it is a completely. Centralized organization, and that it is an ideal answer to S & T information problems.

Boris M Tareev of VINITI writes: "In addition to the information activities of VINITI, considerable work is also done in other organizations. The Book chamber prepares a bibliographic listing of all the books published in the USSR, and issues a weekly bibliography knizhnaya letopis (Book Index). The papers from many Soviet journals and publications of Soviet Scientific research Institutes are listed in the weekly Letopis Zhurnalnykh Statei (Index of Periodical Articles). Book reviews and critical

reviews are listed in the quarterly *Letopisi Retssensii* (Review Index). The descriptions of bibliographic guides which have been issued in separate edition or have been published in journals and books are listed in the annual *Bibliografiya Sovetskoi Bibliografii* (Bibliography of Soviet Bibliographies). Books published abroad are listed (and often reviewed) in the monthly *Novye Knigi za Rubezhom* (New Books Abroad) which is published in two series by the Foreign Literature Publishing House. Information on new inventions for which authors certificates have been issued in the USSR are reported in *Byulletin Izobretenii* (Bulletin of Inventions) published by the Committee for Inventions and Discoveries. Annotated bibliographies of scientific literature by subject field are issued from time to time by the Academy of Sciences of the USSR and by some of the larger libraries. The USSR Academy of Sciences publishes lists of publications by notable scientists of the USSR. Many institutions of higher learning issue lists of literature recommended for their students and research workers. Many ministries, agencies, *sovnarkhozes* (regional economic councils) and the larger industrial enterprises compile specialized bibliographic bulletins in different, relatively narrow, subject fields of technology to inform the workers in industry of published reports on new and significant developments.* [172]

The USSR has succeeded in organising the world output of scientific literature through a national information system comprising of a Network of 6 All-Union Institutes including VINITI, 63 branch institutes, republican centres, Numerous information Bureaus, research institutions, industrial organization.

All Union Institutes prepare nearly one million abstracts covering scientific developments of the world. As their coverage of respective subject zones are well defined there is little chance of duplication in work. Referativnyi Zhurnal, the abstracting journal published by the VINITI covers the world output of scientific literature to a considerable extent.

VINITI is not the only All Union Institute within the Soviet Union. There are currently seven large [173] All-Union Institutes for information within the USSR. They are :

1. All Union Institute for Scientific and Technical Information (Vsesoyuznyi Institut Nauchnoi i Tekhnicheskoi Informatsii) VINITI, 1952
2. All Union Research Institute for Medical and Medico-Technical Informations (Vsesoyuznyi Nauchno-Issledovatel'skii Institut Meditsinskoi i Mediko-Tekhnicheskoi Informatsii) VNIIMI 1962
3. All Union Research Institute for Technical Information, Classification and Coding VNIITK, 1964

4. All Union Institute for Scientific and Technical Information in Agriculture (VINITISH), 1963
5. All Union Information Fund of Standards and Specifications (VIFS)
6. The Central Research Institute for Patent Information and Technical Economic Research TsNIPI (Tsentralnyi Nauchnoissledovatel'skii Institut Patentnoi Informatsii), 1963.
7. The Central Research Institute for Scientific Information for Building and Architecture TsINIS, 1963

Automation :

In the Soviet Union the adoption of computer technology in information and library services assumed significant proportions in the mid-1960's which was first introduced in all-Union, and later on at many Central departmental and Republic information Centres and Libraries. Modern mechanization and automation services have been undertaken on the formulation of standard bibliographic description of materials including books, periodicals, reports, catalogues, reference works etc. [174]

The automated information systems in the USSR make use of almost all types of technical devices. Various methods of using computers to provide readers with information

are being formulated and introduced at the SPSTL (State Public Scientific and Technical Library) of the Soviet Union, and the state Library of Foreign Literature. Similar studies are being carried out at the V I Lenin State Library and certain other Republic libraries of the Union Republics. Automated Union catalogue are being compiled by the Information centres and libraries of the USSR. This system consists of bibliographic descriptions of Foreign literature received by various libraries of the USSR. More than 1000 libraries [175] including information centres in the Soviet Union are assisting in the compilation of the Union Catalogue.

Coordination :

Cooperation and Coordination of information Services, presently achieved in the USSR is something worth emulating by other countries. There is a widespread impression in the United States that VINITI constitutes the entire Soviet S & T information system, that it is a completely centralized organization, and that it is an ideal answer to S & T information problems [176] The responsibilities of the information institutes functioning at various levels have been clearly established. The multitude of information

institutes fits into the overall system in a well coordinated manner to form a national grid of scientific information. Coordination of information services helps to:

1. avoid duplication of materials, resources and efforts;
2. Control national economy;
3. Channelize the available resources towards set goals;
4. Expedite the flow of information with greater efficiency and
5. aim at comprehensive and complete coverage in the services offered.

The Scientific Council of Problems of Science and technical information and Propaganda of the state committee of the Council of Ministers of USSR on Science and Technology is the ultimate plenary authority on matters of coordination of information services. VINITI has been entrusted with the responsibility for enforcing the coordination efforts, and a department of coordination functions in VINITI since 1963.

The areas of operation of the seven All-Union Institutes are clearly delineated to avoid any dissipation of effort. Similarly the Branch institutes have the

major responsibility for controlling unpublished information, in as much as the All-Union institutes are already taking care of published information. The question of handling foreign literature is also centralized with the All-Union institutes. The Branch institutes in turn coordinate information activities of all the units coming under their perview. They solve all the inter-institute problems. The republican centres solve problems of coordination among the different branch and individual information institutes coming under their jurisdiction. VINITI's Department of coordination organizes All-Union meetings in which representatives from branch and republican Centres and other All-Union institutes participate to arrive at mutually agreed plans for improving the coordination efforts. [177]

V

INFORMATION ACTIVITIES : INDIA

Developing countries have of late come to realize that a well organized information system is essential for using scarce resources optimally in order to accelerate development. For example, India has launched the NISSAT programme which envisages National Information System for Science and Technology to assist entrepreneurs, coordinate Research and Development and facilitate planning. [178]

One of the great strengths of the Nation is the great array of intellectual, scholarly, and research resources to be found in its libraries and information centres, without integration and close cooperation, however, these resources will remain a series of separate insulated institutions. [179] The science and technological development and therefore, industrialization is adding to the necessity of systematizing and organizing documentation and information services in India.

The technological revolution of the present century has clearly laid emphasis on the exploitation of scientific knowledge. Those countries, which have the intellectual power to exploit the new dimension of science,

and apply the same in creating the industrial and economic revolution, will be a better nation economically and materially. [180] The tempo and success of information activity is determined by the degree of intensity and sophistication of the industrial and social environment and the information activities of a country is very much interlinked with the research and developmental activities of the country. This interlinked or relationship in India has been witnessed since India's independence, but the organized scientific research had started even before its achievement of independence.

The responsibility for establishing and operating a system of documentation, information and library services must be regarded as important functions of the state :

* The logic of the situation in developing countries obliges the government to take the initiative in the establishment of documentation service relying upon the laboratories, research institutions, and universities operated with public funds." [181]

Both preparing and establishing such a system have to be seen as an inalienable part of the state policy concerned with the nation's economic and social development. The same news were also expressed in the report of the Advisory Committee on the application of science and

technology development for the Economic and Social Report.

[182] The participants in the symposium on documentation planning in developing countries held by the FID/DC Committee in Bad Godesberg (Germany) in 1967 clearly requested that a project for such a system should be included in every national development plan.

The Government of India having realized the necessity of science and technology and feeling convinced that without this nation building was impossible, has given more and more emphasis on technical and scientific research and which has been reflected in the successive five-year developmental plans and which has also been confirmed by the government declaration in 1958, [183] taking resolution of the science policy, which stands as a national faith and instrument of national progress of India.

The organization and functioning of Indian national documentation and information activities can best be appreciated against a background of the total research and technological effort of the country as a whole including the governments' interest and support of such activities and the industrial or other nation

building activities in the country. In a quickly developing country like India, this aspect of interrelationship assumes special importance, because like the conscious and planned efforts of the country to accelerate the pace of industrial and social growth, the documentation and information activities need constant observation and planning to sustain the efforts of scientists, research workers, engineers, managers and all others engaged in such activities.

Technical & Scientific Activities in India :

In the second paragraph of this chapter, it has already mentioned that scientific activities were started even before India's Independence. In India the Royal Asiatic Society of Bengal was established in 1784 [184] which year is regarded the landmark for the beginning of scientific activities in the sub-continent of India. In some of the other landmarks activities in India, mentioned may be made, such as starting the Trigonometric survey in 1800, the establishment of institutions like Geological and Botanical survey towards the end of 19th century and Zoological survey, Anthropological survey in the beginning of the 20th century, all these were created to have a view

of the natural resources of the country. The Journal of the Royal Asiatic Society of Bengal is the first scientific periodical for spreading scientific work in India, was started in the year 1832. [185] Medical research was initiated in India in the close of 19th century and abstracting work was also started from this period as the Calcutta Medical News published in 1880 [186] under the guidance of Surgeon Major D B Smith and Surgeon Major J M Coates. Academic research was created with the establishment of the first three universities in 1857 in Bombay, Calcutta and Madras. These provided the stimulus for the growth and development of scientific research and programmes of socio-economic development and gradually social and economic pressures created the necessary situations for the establishment of institutions where research on some of the basic problems could be tested.

In the first decade of this century, the Imperial Agricultural Research Institute, now known as the Indian Agricultural Research Institute was established. Two more research centres were also developed in the 2nd decade of this century, one of which being the Indian Institute of Science, established in 1914 [187], for the pursuit of research work in the field of pure and applied sciences and the other is the Indian Association

for the cultivation of sciences, where Prof C V Raman made his well known discovery in March 1928. [188] Besides, further research centres were also established such as Forest Research Institute, the Central Research Institute, Central Board of Irrigation and Power and later on research work in universities got activated.

During the period of re-organization of the Indian Council of Agricultural Research (ICAR) efforts were made to develop the libraries of the ICAR's institutions and research institutions, in which the agricultural universities also have taken part. The ICAR appointed an Indo-American Agricultural Study Team under the chairmanship of Dr Dorothy Parker and the report of this study team was published in 1969 [189] which bears concrete suggestions for the planned development of Agricultural libraries and library services at National Level.

In fact the tempo of these services is a factor of the intensity of the country's research and developmental efforts. In India, although organized and institutional research had then origin in the eighteenth and nineteenth centuries and having its independence in 1947 a new spurt was given to R & D activities and for the better utilization of the national resources of the country some new

agencies were created some of which are the Oil and Natural Gas Commission. The Indian Bureau of Mines etc., Agricultural Research and the Medical Research were organized under the Indian Council of Agricultural Research and Indian Council of Medical Research respectively. The number of scientific research institutes which were about two hundred at the time of independence of India arose about 1500 in 1976. The establishment of Universities in all over the India increased at about 130 including six institutes of technology. There were 126 Engineering Colleges and 289 institutions offering degrees and diplomas, which were very small in number in comparison with the time of 1951 when there were only 10 in numbers. [190]

Industrial Research :

India was known as an agricultural country before 1940 [191] and as such scope for industrial research was almost ignored. It is well known today that the Research and Development (R & D) activity is the life-blood for a country's industrial development leading to its economic advancement. " The need for R & D activities for India, has never been so vital and great as it is today." [192]

During 2nd World War, there was an urgent need for developing Indian industries. The Government of India had given a keen interest in the development of industrial research and set up a Bureau for making a survey of the existing scientific activities particularly in applied fields and a select list of articles on different industries prepared and finally published under the title Bibliography of Industrial Publication in India. [193] This organization was the forerunner of the Council of Scientific and Industrial Research (CSIR) established in 1942. A significant feature of the post-war period was the programme for rapid industrialization, when many industrial and research centres were formed. And at this time need for providing exhaustive information towards researchers was realized and the newly established Council felt that the building up the libraries in the national laboratories would be indispensable for providing information and the need for a national documentation centre to meet the residual demands. [194]

After attainment of the independence of India, with a truly national government in power, the country has embarked upon industrialization and the Council of Scientific and Industrial Research has grown into a vast complex of research laboratories and is the main agency for the development of technologies and their utilization

in industries. In the First Five-Year Plan 1951-52 to 1955-56 [195] of India, more emphasis was given to create the base for rapid economic and industrial advancement. The industrial research got impetus with the establishment of CSIR and with it came the need for different type of information for scientific research and also sponsored research in laboratories of universities and other research institutions. The two agencies mainly responsible for providing facilities and impetus to scientific research in India are:

1. the Council of Scientific and Industrial Research; and
2. the University Grants Commission.

CSIR has brought a chain of 24 laboratories into existence. U.G.C. which was also headed by a scientist for a long time has been providing laboratory and other facilities on a liberal scale for research in universities.

[196]

Research in Atomic Energy, Space and Electronics:

Research in the field of Atomic energy has been started in India with the setting up of the Atomic Energy

Commission under the Atomic Energy Act 1948. [197] This commission of the Atomic Energy has set up the Atomic Energy establishment in 1944 for undertaking research and development in atomic energy. The principal centre of research in Atomic energy is the Bhabha Atomic Research Centre at Bombay, which is comprising of four research reactors and produces over 350 types of radioactive products. [198] In addition to major research organizations, both the central and state governments established research centres in various areas after independence. The Department of Space and the Space Commission were established in 1972. [199] This Commission was entrusted with the responsibility for developing space technology in India and the successful launching of the first Indian satellite, the Aryabhata on 19 April 1975. [200]

In the field of Electronics, the Government of India has taken up the responsibility by establishing the Electronics Commission in February 1971 [201] which will formulate national policies in this field. After independence the research activity in India was intensified in successive plan periods. The increase in scientific and technical activity also reflected by the growth of scientific societies which increased to 116 in 1963 as

compared only four in 1900. [202] The breakdown of the societies : 18 in the physical sciences, 26 in the medical sciences, 26 in the biological sciences, 26 in the engineering and technological sciences and 14 in general.

Defence Research :

Information forms an integral part of any R & D activities. It becomes more significant when required for strategic areas, as defence research and development which are directly linked with the national security. An efficient documentation system is necessary to the scientists to check duplication in research effort, purchasing weapons and equipment for the defence of a country, can be possible for correct choice if there is a good information system. In India, the National Government has given thought to defence research after its independence. R & D activities of the Ministry of Defence started in 1948. [203] With this formation of defence science organization, when information service was confined only to indexing of current literature and building up of defence science library. This service later on was enlarged with the establishment of Scientific Information Bureau in 1958 [204] and this Bureau turned to the Defense Scientific Information

and Documentation Centre (DESIDOC) in 1967 and its library known as Defence Science Library which stocked 1,32,300 volumes. The growth of library collections from 1970-80 is shown in Appendix 'E'. [205] Its publications are as follows:

1. List of Current Scientific Literature (bimonthly);
2. SDI Bulletin;
3. Patents Information Alerts (bimonthly);
4. Defence Reports Abstracts (bimonthly).

All these are relevant to defence R & D projects. A Technical Information Centre has been set up in Sena Bhavan, New Delhi, which provides library and reprographic facilities.

Research in Central and State Ministries :

In India, a large number of research centres and organization have been established under the control of the Central Ministries as well as under the State Ministries, Public Health, Agriculture, Animal Husbandry, Medicine, Communications, Housing, Railways, Steel and Mines, Petroleum and Chemicals, Public works.

National Institute of Sciences :

The first abstracting periodical in India was the Indian Science Abstracts which was started in 1935 under the National Institute of Sciences in India. It may be said that the National Institute of Sciences of India modelled on the lines of the Royal Society of London. The coverage of the Indian Science Abstract initially was only of those papers that were published in India, but afterwards it included papers of Indian origin irrespective of the country of publication. It continued upto 1940. [206] Insdoc, started this publication again in 1965.

The Central Board of Irrigation in India began to publish its abstracting journal Quarterly Bulletin in the year 1936 [207] which is the most important epoch in the early history of documentation work in India. This abstracting periodical has been continued as the Irrigation Abstracts published by the Central Water and Power Commission.

The research institutions and societies mentioned in the earlier paragraphs had taken considerable care in building up libraries with large collections in the various fields of science and technology. The libraries and library materials of all these institutions should also be

taken into consideration in the organizations of India's National Documentation and Information services.

Library development in India started [208] in 1910 from Baroda now a part of Gujrat and library education in the form of apprenticeship from the same place in 1911. From 1929 certificate course was conducted by the Madras Library Association and in 1931 this library course was taken over by the Madras University converting it into a post-graduate Diploma course in library science in 1937. By 1947 librarianship had marched ahead with five new centres or schools at Madras, Varanasi, Bombay, Calcutta and Delhi, and today in 1981 there are 45 university schools in India conducting Post-Graduate Diploma, 17 conducting Master's Degree courses and 10 universities conducting Ph.D. programme in library science and a number of special libraries in National laboratories and some big libraries along with research institutes came into existence which accelerated research activities in various branches of science and technology in different parts of the country. There are at present 34 national laboratories in the country [209] dealing every major branch of science and technology. Table 3.2 describes only a rough account of the year of foundation of libraries in India of which 50% of the libraries have been established after the independence of India. [210]

Table-3.2

Period covered	1900	1901	1906	1911	1916	1921	1926	1931	1936	1941	1946	1951	1955
	to before 1905	to 1905	to 1910	to 1915	to 1920	to 1925	to 1930	to 1935	to 1940	to 1945	to 1950	to 1955	to 1960
Number of libraries esta- blished during the period	35	6	14	8	27	26	13	18	17	30	50	75	96
Total upto the period covered	35	41	55	63	90	116	129	147	164	194	244	319	415

In the report of the Planning Group on the educational development in the Fourth Five Year Plan of India, it is stated that out of 5223 blocks spread over the rural areas in the whole country 1394 blocks had libraries. A working Group of the Planning Commission of Libraries tells that in the year 1965 there were 28, 317 village libraries. The above situation increased the expenditure greatly on R & D activities and it has been estimated that there has been a tenfold increase in the R & D expenditure in India and annual expenditure was likely to reach Rs. 3,000 million by the end of Fifth Plan Period (1974-79). "This expenditure has risen from Rs 47 million in 1950-51 to approximately Rs 4,000 million in 1976-77. The number of scientific and technical personnel in India was estimated to be 2.3 million in 1977. These scientists and technologists normally work in research laboratories and institutions which number about 350". [211] The CSIR scientists have drawn the plans for scientific research in the Fourth Five Year Plan, where an average of 1 per cent of the national income were invested in scientific and technological research in India. This would mean that an investment of Rs. 1,129 crores should be provided for a significant advancement in scientific research activities of the central and the state governments, defence,

universities and the organized sector of industry. [212]

National Committee on Science and Technology:

During the present century and particularly during the last few decades, there has been an extraordinary increase in scientific research, which necessitated in the establishment of a new department of science and technology in May 1971 of the National Body to advise and assist the government on all matters relating to the development of science and technology of the country. Table-3.3 will show the total number of scientific and technical personnel in R & D establishment of 1969-70. [213]

Table-3.3

Name of establishments	Number of personnel
CSIR	9,515
Dept. of Atomic Energy	7,854
DRDO	7,550
ICAR	7,820
ICMR	1,585
Other Central Ministries	22,500
Universities	8,250
State Governments	11,357
Private Sector	3,147
Total	79,583

The above account clearly reveal that there should be a Network of scientific laboratories in India and in order to supplement the limited facilities available in the various research institutions the need for documentation centre was keenly felt. In November 1946 [214] the FID (International Federation for Documentation) invoked the good offices of the ISO (International Organisation for Standardization) to stimulate the formation of a national documentation committee in each country. An unambiguous pronouncements by the biggest libraries in the world that " International bibliographical activities had proved that the fruits of international collaboration could not reach most of the users of information unless each country organized its own national system of documentation. International organization like Unesco and the FID were also opined the same view. The detail of the scheme for documentation centre in India were worked out in 1950 by the Govt. of India with the help of Dr S R Ranganathan and UNESCO as a part of technical assistance which was to provide documentation services towards the existing national laboratories, scientific research institutions, technological institutions, universities, industries and so forth. [215] All the above consideration led to the establishment of a centre in 1952. The centre was named

INSDOC (Indian National Scientific Documentation Centre).
This centre comes under the Council of Scientific and Industrial Research. The Council has placed this centre under the administrative control of the Director, National Physical Laboratory. The functions assigned to the INSDOC when it was established include:

1. To receive and retain all scientific periodicals which may be of use to the country;
2. To inform scientists and engineers of articles which may be of value to them by issuing a monthly bulletin of abstracts;
3. To answer specific enquiries from information available in the centre;
4. To supply photo-copies or translations of articles required by individual workers;
5. To be a national depository for reports of the scientific work of the nation, both published and unpublished;
6. To be a channel through which the scientific work of the nation is made known and available to the rest of the world. [216]

The Indian National Scientific Documentation Centre (INSDOC) which was established in 1952 under the CSIR, has been offering national service relevant to the information needs of scientists and technologists. Responsive services such as document procurement service, photographic service, bibliography and reference information service and

translation service and abstracting services in the form of bringing out information publications such as the Indian abstracts, are being provided by the centre. It has also taken up several projects for information dissemination function. [217] (An organizational chart of INSDOC is shown in Appendix-F).

The development of INSDOC as a national centre was therefore, suggested not only for co-ordinating the activities of the scientific and special libraries but also as a centre for central acquisition and dissemination. Most of the above functions are carried on by INSDOC and some new responsibilities are also added. INSDOC, published INSDOC List of the Current Scientific Literature from the year 1954 which was regarded as a highly selective list. The publication of this list was stopped in 1965 [218] and was superseded by the publication of Indian Science Abstracts from the year 1965, covering Indian contributions in various fields of science, which was initiated by the National Institute of Science of India (Now the Indian National Science Academy) in 1936 and continued upto 1938. Another project the preparation of the Union Catalogue of periodicals available in libraries of India. The first attempt was made by Stanley Kemp in 1918 [219] publishing Catalogue of the Scientific Serial Publications in the

principal libraries in Calcutta, under the auspices of the Asiatic Society of Bengal. The National Science Library project which was an integral unit of INSDOC, was conceived in 1964 as a cooperative acquisition facilities for building up a balanced collection which would survey the holdings of scientific institutions and supplement the lacunae in their collections, as far as avoiding duplication. And the National Science Library in India has already been established at New Delhi. [220] With the establishment of INSDOC, India became a national member of FID in the same year 1952. The FID assigned the work on the general theory of classification to Dr S R Ranganathan. Reports submitted from India were based on the work done by the Indian school in the field of depth classification. In 1960 the secretariatship of FID was assigned to India. [221]

INSDOC was established to support the research activities of the country and side by side a large number of specialized research complexes, obliged the authorities to develop documentation facilities of such mission-oriented centres e.g. Library and Information Services of the Bhabha Atomic Research Centre (BARC), the Defence Science Information and Documentation Centre (DESIDOC), the National Medical Library, Indian Agricultural Research Institute, the Patent Library and Information Centre, the Library of

the Indian Standards Institution, the Small Enterprises National Documentation Centre (SENDOC) and Social Science Documentation Centre. Apart from these, there are nearly 1000 [222] Information Centres in India has come into being in the various fields of Science and Technology.

SENDOC :

The small enterprises National Documentation Centre (SENDOC) was set up in 1971 at SIET Institute, Hyderabad. The work of Science is organized into various sections namely library, documentation, audio-visual, publications, organizational communications and data processing. The centre collects and organizes information on small industry development in all its ramifications. A bi-monthly Sendoc Bulletin is being published since January 1973. Bulletin provides information - New Products and Processes, Industrial Profiles and prospects; technical notes, Sendoc services, and current literature. Another service for which there is a great demand is the technical enquiry service. The audio-visual section has microfilming and photo-copying equipment, Xerox, diazocopying unit, teaching and training aids, etc. Sendoc publishes SEIME, SIET Programme Bulletin, SENDOC Bulletin and Appropriate Technology Documentation Bulletin. [223].

SSDC (Social Science Documentation Centre)

ICSSR (Indian Council of Social Science Research) set up in 1969, has taken up as one of its first tasks the establishment of a national Social Science Documentation Centre (SSDC). The SSDC has published the Union Catalogue of periodicals currently in record in Delhi Libraries and the Union Catalogue of Social Science Periodicals, Delhi. It is receiving about 1000 titles of current periodicals and they are displayed in campus of Jawaharlal Nehru University for making them accessible to Social Scientists in Delhi and outside. The SSDC has also a programme for bulk purchase of documentation serials such as the Indian Behavioural Science Abstracts and the Indian Press Index for distribution to selected Universities, post-graduate colleges and research institutions. It has plans to enlarge its activities in the near future by setting up a Depository Library to houseless used materials transferred to it by service libraries by establishing reprographic services.

DRTC:(Documentation Research and Training Centre)

It was established at Bangalore in 1962 to meet the demand for trained documentalists required in ever growing

number by the research institutions, national documentation/ Information Centres and industries, etc. Dr Ranganathan was closely associated with its inception, planning and working. He took active part in teaching, research and administration of the Centre during the first three years, i.e. upto 1965. Thereafter, he restricted himself to guiding research. DRTC offers 1-2 years course in documentation and information service, as successful completion of the course 'Associateship in Documentation' is awarded by the Indian Statistical Institute. Like INSDOC's course, this has also been recognized by the Government of India equivalent to a post-graduate qualification in Documentation. [224]

IASLIC : (Indian Association of Special Libraries and Information Centre)

IASLIC was established at Calcutta in 1955 to support the activities of special libraries and Information Centres in the country. In accordance with its second and fourth objective, viz. to improve the quality of library and information services and documentation work, and to improve the efficiency of technical workers and also to act as a centre of research in special librarianship and documentation techniques, a training course in special librarianship was

started in 1966. It was a part-time course of 6 months duration open to persons working in special libraries. The course contents comprised of the following:

1. Research and technical Library Service ;
2. Depth classification (theory & practical) ;
3. Cataloguing and Indexing (theory & practical);
4. Documentation & bibliographical services;
5. Information Service;
6. Reprographic and translation services, and
7. A project paper.

On successful completion of the course a certificate in special Librarianship was awarded by IASLIC. The course has been suspended since 1970. [225]

In a vast country like India, with a developing economy, federal structure of the government, and autonomy of the provinces, scientific and technical activities are widely dispersed. A variety of information centres, with differing functions, scope and efficiency are taking shape in scientific institutions, government departments, industrial establishments, business firms etc. In a stage of development, they spring up piecemeal, without liaison between them, without plan, and without coordination a somewhat haphazard fashion. The information activities of

these organizations are desirous to meet the local demand of scientists and technologists, research workers, industrialists. For effective utilization of these centres, interlinking is required which is possible through national network or system.

" A national information system is basically a network of existing information resources together with new services for identifying gaps, so co-ordinated as to reinforce and enhance the activities of the individual units and thus enable specific categories of users to receive the information relevant to their needs and abilities." [226]

It should therefore be the main objectives of a National Information System to interlink and coordinate the various information centres and their services into an effective national information network.

The developments mentioned above and other similar developments changed the documentation scene in India considerably. The change soon made the planners of India for documentation facilities realize that the time was ripe to think along the lines of integrating the different agencies and facilities, that developed in response to the information requirements of certain major sectors of activity, and bring about a well-knit national information system. Developments in the international field also suggested a similar course of action. The planning and

operation of a few international information systems brought out one point clearly that to participate effectively in International Information System, a well organized National System is prerequisite. [227]

In India, the rapid growth of information and the increasing number of information centres demand the development of a suitable national information system on a priority basis. Even in the developed countries, they realize this need, though having a large number of information centres and services. Because it is imperative to evolve a National System which maximises the use of their information resources. Hence, scientific information is beginning to be regarded as an important national resource to be developed and made accessible to various kinds of users according to their needs.

The Government of India having been realized the importance of scientific information and made a systematic attempt to evolve a Science and Technology Plan as an integral part of the larger socio-economic plan of India. The Government's support to the accelerated developmental activities in information services were clearly evinced through the formation of a number of committees. The important ones are [228] Krishnan Report in 1955, the

Thacker Report in 1958, the recommendations of the Estimates Committee in 1959. The Ranganathan Report in 1959, the recommendations of the Working Group on Scientific Research of the Planning Commission in 1959, the Kothari Committee Report in 1960, the Lazar Report of 1964, the Ray Committee Report of 1967.

In December 1975 a Seminar on "Towards the Evolution of an Information System for national Development", has organized by INSDOG on behalf of the National Committee for FID to mark the 80th Anniversary of the FID in New Delhi. During the Seminar 25 papers were presented. These papers were discussed in four technical sessions devoted to

1. A national Information Systems ;
2. Industrial Information ;
3. Sectoral/Mission oriented Systems and
4. Computer-based Information Systems and Manpower Development.

This discussion brought out a number of issues which were relevant and important for developing a national information systems, and it should be the main objectives of a national information system to interlink and coordinate the various information centres and their services into an effective national information network. The seminar made the following recommendations: [229]

1. The Department of Science and Technology of the Government of India, should Launch the National Information System for Science and Technology (NISSAT).
2. Sectoral Mission-oriented information systems, pooling the existing resources available in the country and covering areas of national importance such as Food, Agriculture, Public Health and Family Planning, Human Settlements, Environment, National Resources and Energy which are essential for improving the quality of life of a large majority of population should be developed on priority basis by the government.
3. Attention should be given to building up expeditiously a strong data base for supporting national planning process and for government decision making.
4. The government departments responsible for generating socio-economic and techno-economic data and reports should evolve suitable mechanisms for making available this information.
5. Attention should also be paid to building up diversified industrial information services.
6. The government should buildup a strong patent information system.

7. Attention should be paid to the application of modern information technology and formulation and adoption of uniform standards for improving facilities and services.
8. Adequate facilities should be provided for advanced training in specialized manpower, and
9. The government should have adequate provision for supporting projects and programmes in the information field.

NISSAT Plan :

However, a serious thought was given to the need for establishing a strong national network of documentation and information activities to meet the growing information thirsts of the Scientists, technologists and research workers of the country and as such in August 1971 a request was made to Unesco for a short-term mission of a consultant to advise the Indian National Scientific Documentation Centre (INSDOC), New Delhi. Accordingly Dr Peter Lazar was assigned the mission during March-April, 1972 [230] establishment of a National Information System for Science and Technology for India.

In the meanwhile the Government of India had formed a high powered apex body the National Committee on Science and Technology (NCST) in October 1971 with the task of preparation and updating of the national scientific and technological plans, both Five Year Plans and perspective plans. The NCST, set itself with the task of preparing a comprehensive science and technology plans for a period of 5 year 1974-79. And thus several panels and planning groups were constituted by NCST for preparation of various sectoral plans, among these panels one group was also constituted on the Information Sector. The report of this Information panel was submitted in 1973 [231] recommending the establishment of a National Information System for Science and technology (called NISSAT in short) with the nucleus of information facilities available in laboratories of Government Scientific agencies and public and private sector industries. It is envisaged that the system will be implemented through a Central agency (NISSAT) reporting to the Department of Science and Technology. (Diagram of NISSAT programme is shown in Appendix 'E').

Budget of NISSAT :

The out lay (capital & recurring) over the fifth plan period was estimated at Rs 15 crores out of which Rs 4 crores was in foreign exchange. [232]

The expenditure was likely to be phased as follows:

Plan Year	74-75	75-76	76-77	77-78	78-79
Outlay (Rs in crores)	1	1.5	4.5	4	4
	Ground work		Growth	Consolidation and Divestment	

The sum of Rs 15 crores budgeted for NISSAT includes the design and construction of buildings, fixed installations and peripherals but excludes the cost of computers. In the last year of the Fifth Plan when the network is consolidated, individual units of the network will be handed over to their respective parent organizations. Thus about 25 percent of the facilities will be diverted to the individual organizations by the end of the Fifth Plan. Their recurring expenses would appear as non plan (VI Plan) expenditure of the respective organizations. In the VI Plan NISSAT itself would have a plan outlay not exceeding Rs 5 or 6 crores.

The proposed outlay of NISSAT amounts to just under 1 percent of the plan outlay of the Science and Technology Plan. The tentative break-up of this outlay among the major sectors is given below. The figures exclude the cost of computer installations. [233]

Table-3.4

No.	S e c t o r	Plan outlay	Foreign exchange component (Rs Crores)
1	Natural Resources, Meteoro- logy and Atmospheric sci- ences	4.0	1.5
2	Information base for inte- grated development of rural urban and regional systems	1.0	0.2
3	Engineering Industries and construction	3.0	0.5
4	Other industries	2.0	0.3
5	CSIR and National Medical Library	3.0	1.0
6	General (DGTD, Patents office, CSO etc.)	1.0	0.1
7	NISSAT Agency:		
	a) Design & Development Contracts for information technologies	0.5	0.3
	b) Education and Training	0.3	0.1
	c) Planning and Administra- tion	0.2	-
T o t a l		15.0	4.0

A fundamental prerequisite to the establishment of a functional world information system is the emergence of well organized national information system. The developments mentioned above changed the documentation scene in India. National information systems, in turn, depend heavily on an all round growth of discipline-oriented information subsystems supported by regional information centres.

The National Information System for Science and Technology (NISSAT) in India was launched on 13th May, 1977 [234] when formal approval to the scheme was accorded by the Government of India. The action programme of NISSAT envisages interlinking and coordination of the large numbers of sub-sets of information sources, systems and services into an effective information network under an over all coordinating body with a national information plan for guidance. Lacunae in information sources, would be identified and for this, efforts would be made to fill up gaps. Modern information technology and management system would be introduced for the improvement of the efficiency and effectiveness of science and technological information services which would buildup a strong information infrastructure for supporting country's R & D activities and thus creating an effective information network under an over all coordinating agency, upgrading the existing

documentation centres and augmenting the facilities where necessary and establishing new centres for areas not covered already are the main prongs of activity envisaged under NISSAT.

Structure of NISSAT :

The NISSAT would be a multi-tier organization, comprising of [235]

1. National Information Centres (NC'S)
2. Regional Information Centres (RC'S)
3. Branch Information Centres (BC'S) and
4. Local Information Units (LIU'S)

The functioning of the NISSAT would be in several tiers. The present and proposed national centres of information (NC's) in Science and technology, medicine, agriculture, defence science, nuclear science, patents, standards, small industries, social sciences, etc. would constitute the top level of organization. They are mission-oriented information centres operating at national level. The regional centres of information (RC's) like the Regional of ^SINDOC at Bangalore, would constitute the second level. The Branch information centres (BC's), which are subject-

oriented and providing national service are in the third level of organization. The local information units (LIUs), forming part of individual R & D establishment and serving the specific needs of the users in their parent institutions, are the lowest level of organization. [236]

The NISSAT is a flexible system, with its components operating under a variety of ownerships and jurisdictions but collaborating together under the guidance of a coordinating body. What is envisaged is some sort of federation of many scattered and previously existing information centres and libraries and establishing new centres for areas not covered already in order to fill up gaps in information facilities where necessary, the existing centres would be upgraded and the facilities augmented. The establishment and maintenance of information centres in the various levels would be the responsibility of the agencies of the institutions to which the information centres belong.

As the first phase of NISSAT's activity the following four sectoral information centres have been selected for funding and up-grading as the NISSAT Sectoral Centres: [237]

Sectoral Centre

1. Leather Technology

2. Food Technology

Institutions

Central Leather Research Institute,
Madras.

Central Food Technological
Research Institute Mysore.

Sectoral Centre**Institutions****3 Machine Tools****Central Machine Tools
Institute Bangalore****4 Drugs & Pharmaceuticals****Central Drugs Research
Institute, Lucknow.**

It has been expected that every year more such centres will be planned for up-grading as the NISSAT Sectoral Centres.

NISSAT National Focal Point:

The Department of Science and technology acts as the National Focal Point for the NISSAT. In this role, this Department has been entrusted with the following functions for science and technology development of the country: [238]

1. Formulation of a national STI Policy;
2. Formulation of a national plan of action;
3. Incorporation of the national STI policy and plan in the overall national S & T plan and Five-Year Developmental Plans;
4. Establishing mechanisms for implementing the policy and plans;
5. Allocating finances for the STI programmes;

6. Development of information resources and services;
7. Development of resources of manpower, equipment etc. needed for the services;
8. Coordinating the activities in the area of STI with all organizations and agencies in the country as well as ensuring international coordination and cooperation;
9. Formation of criteria, guidelines and standards;
10. Promoting and supporting research and development;
11. Promoting education and training programmes in information and user education and other information activities in general;
12. Monitoring and evaluating of the performance of the system; and
13. Act as the point of interaction with world information services, systems and programmes.

Other Specialized Services :

An experimental computer-based SDI service was started in January 1976 [239] using the IBM 370/155 computer of the Indian Institute of Technology, Madras with the Chemical Abstracts Condensates. This project was carried out by INSDOC, New Delhi and IIT Madras with the assistance of Unesco. Users from a few Asian countries participated in the experiment and from January 1977, INSPEC A & B data bases have been added to the SDI service. The number of profiles was being increased to about 300.

More data bases, such as COMPENDEX, Biological Abstracts, USGRA, ISI etc., were planned to be added to the service in future. The software used was CAN/SDI of the Canadian National Science and Technology Institute, Ottawa. Two Indian Scientists were initially trained in Canada in CAN/SDI of the Canadian National Science and Technology Institute, Ottawa. Two Indian Scientists were initially trained in Canada in CAN/SDI system for starting the project and financial assistance were met by the NISSAT.

On-Line Access to Foreign Data-Bases:

With the assistance from Unesco and the European Space-Agency, an On-line demonstration of the ESRIN/RECON Data Base System at Frascati, near Rome in Itali was arranged for a Week-long in the Tata Institute of Fundamental Research, Bombay during September, 1976. [240]

The Frascati Centre had 10 data bases and provided access to about 7.5 million references at the time. The Satellite Communication segment between Bombay and Rome was used for the purpose. A special cable capable of data transmission at 4800 bps was laid for 6 km length between the overseas Communication Centre and the point of demonstration and about 700 scientists, engineers and research workers

participated in the demonstration. Using an interactive terminal, the users in Bombay could interrogate the data base at Frascati and get almost instantaneously the results of the search displayed on a video screen as well as get hard copy printouts, if required. And it was then proposed to take up a project for providing permanent terminals at Bombay and Delhi.

Building up of Central Data Base on Themes of National relevance and Data Banks on Technical & Statistical Data:

NISSAT has plans to build up and maintain computer based data bases on themes of National relevance and data banks on technical and statistical data on important aspects, e.g. mineral data, water resources data, environmental data etc.

The scope of the NISSAT would cover all branches of science and technology, including agriculture medicine and public health. It would also embrace nuclear science and defence science, as far as non-classified information is concerned. It would also cover patents and standards information.

Manpower Training :

Effective operation of the various components of a National system of information services requires that specialists of many kinds should be available- subject specialists, information professionals, and others. However, all tasks that require judgement on the value of information in a given field must be made by someone of adequate education and training. In India work on manpower development was taken up from 1975 onwards. [241] Four training courses on Information Systems and services of 5 to 10 weeks duration, were so far organized, with the help and expertise available at the Documentation Research and Training Centre (DRTC), Bangalore and INSDOC, New Delhi, Bombay at BARC and Calcutta at IIRM.

The objective of these courses is to provide the scientists an overall view of the information field and to equip them with the ability to do such kind of work as abstracting, preparation of digests, state-of-the-art and trend reports, providing product/process information services, computer handling of information etc. ^{which} by/they could be of considerable assistance to the sectoral system of NISSAT. A training course of patent Information services was also proposed to be organized at Bombay in December, 1977.

International Cooperation :

India is represented in International programmes for information such as those of Unesco's General Information Programme, FID and CODATA and provides inputs to IKIS , AGRIS and CARIS. The Department of Science & Technology is the point of interaction to the Unesco's information programmes for which a National Committee has been formed. The NISSAT has taken up projects for development of information services with Unesco assistance, such as computer based SDI project and On-line demonstration of ESRIN/RECON data-base of Frascati. India also participated in Unesco's Regional STI Policy Meetings in Sri Lanka 1974 and New Delhi in 1976.

Besides, the NISSAT Scheme will attempt to utilize the various standards, guidelines, etc. developed under the frame work of Unesco's General Information Programme and those recommended by ISO.

Remote Sensing for Natural Resources Data Collection:

The Government of India has established the National Remote sensing Agency (NRSA) in 1974 at Hyderabad for making use of the modern technology of remote sensing for quick and

repetitive collection of data pertaining to natural resources of the country. NSRA is now equipped with three aircraft, sensor systems such as Bendix Multi-spectral Scanner, Magnetometers and aerial cameras and a computerized image analysis system (Bendix M-DAS). The project of setting up a ground receiving station for direct reception of signals from LANDSAT's is under examination. The remote sensed data is used for getting inventories of agricultural crops, forests, water resources and mineral resources, for land use planning, updating of maps etc. The NRSA has plans to build up a data bank for storing of the information collected through remote sensing and for retrieval when required.

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CHAPTER IV

**NATIONAL INFORMATION SYSTEMS FOR BANGLADESH
PROPOSAL FOR NETWORK IN BANGLADESH**

CHAPTER IV

NATIONAL INFORMATION SYSTEMS FOR BANGLADESH

The mission of this chapter is to provide a proposal for the establishment of a national information system particularly for science and technology in Bangladesh which should be worked out in the line with NISSAT programme of India. At present Bangladesh occupies an important position in South Asia and houses prestigious number of Research institutions in the field of Health, Agriculture, Engineering and Technology, pure sciences including 6 universities in the country. All the research institutions in the country which are placed under different ministries/divisions/ departments have already mentioned in the chapter I , and the total institutional figure in each subject or related to the subject have also been mentioned in the following section to get a clear picture of the research activities in Bangladesh.

Prior to presenting a proposal for an information network on science and technology in Bangladesh, in context to the well defined guidelines of the UNISIST

and NATIS programme , it would be helpful to take into account the following factors involved in establishing the information systems in general:

1. Need for information
2. Role of information system
3. The importance of science and technology
4. The National Information System(NIS)
5. Objective of the NIS
6. Function of the NIS
7. Planning of NIS
8. Need for NIS
9. Resources of the NIS
10. Manpower Resources of the NIS
11. Financial Resources of the NIS
12. Structure of the NIS : (Levels)
13. Responsibilities of the NIS (Tasks)
14. National Science Information Policy

Need for Information :

It has been observed the world over that scientific and technical information is an industrially exploitable commodity [1] and may countries having

realized the importance of the information which is indispensable for the development of the society, engaged to organize an effective national information system as an essential supporting service for the socio-economic development of a nation.

Dr. Jesse H Shera in one of his articles says, information science was born of mid-twentieth century engineering, particularly electrical engineering as applied to what Shannon and Weaver called communication theory. The roots of information science can be traced back to the end of the nineteenth century with the aspiration of Otlet and La Fontaine and the work of the Brussels Institute for Bibliography. He further said that information science was not outgrowth of any theoretical construct of the aims, principles, and need of librarianship, but rather it emerged from a series of attempts, of varying degrees of success, to apply an arsenal of instrumentation, designed for other purposes of communication, to library operations and systems. [2]

In another article Donald B Simpson, it has been seen that recently considerable discussions were held relating to the potential evolution of a formalized national information service network and numerous points of view

have been expounded from many diverse segments of the universe of interested and affected parties in the network's development. And many other's opinions were centred round technical consideration, structure, possible funding, and potential services, many of the voices raised in discussion represent highly specialized and sometimes narrow views. But among them some interested persons would seem to agree that such a network must be panoramic in scope and provide wide resources. Sharing opportunities as well as serve all types and sizes of libraries so as to reach deeply into the population of the country. [3]

Role of Information System:

This is an assemblage of men, methods and programmes, whose co-ordinated operation provides manifold, diversified communities of users with all the information relevant to them any time, irrespective of origin or physical location and in a variety of possible output forms. A national information system is basically a network of existing information resources together with new services for identified gaps, so co-ordinated as to

reinforce and enhance the activities of the individual units and thus enable specific categories of users to receive the information relevant to their needs and abilities. [4] At the time of setup the new national information system.

The impact of increased number of literate library users to each and every library is expected to be significantly great. This is due to better educational and other living facilities provides by different nations to their ever growing number of citizens. So many libraries have to plan and organize its information services in such a way so as to satisfy these increased number of readers. [5] As national and international awareness of the value of information grows which led the several developing countries to embarked on the planning of national information system.

An agency responsible for a national system or network of information services works with the advises executives and legislative bodies on setting up budgets, preparing legislation and providing leadership for information developments. Usually, a substantial programme must be launched to build up the staff strength the collections of the several institutions most directly

concerned universities, technical institutions, productivity centres, export promotion centres, development banks, central statistical institutes, book production centres, and the like. Such a national agency would also co-ordinate efforts with foreign assistance agencies, international agencies, charitable foundations and other voluntary organizations.

A national scientific and technological information policy can encourage the publication of the results of all indigenous, non-proprietary scientific and technical research, development and applications. It can promote the co-ordination of data centres and library services and the unprovement of abstracting and indexing services, translations and information transfer networks. [6]

There is a growing recognition that the user is the principal design constraint for the information system. Information system design would include the need to develop a system that meets the users requirements with speed and accuracy. Raymond Aubrac in one of his articles [7] divided the users into three categories : first the administrators of bilateral co-operation programmes and the technicians who implement them; secondly researchers

and technicians of all nationalities working on development problems all over the world; lastly the largest community to be served is composed of the authorities responsible for development in the countries where the producers of the information were working, and the national researchers and technicians of those countries, all these are the principal users. The users have been divided into three categories.

The process of design and planning of information system involves setting performance goals, examining resource requirements and constraints, evolving policies and organizational structure that meet the goals with available resources and specifying operating details of the system to achieve the stated goals. [8]

The resource requirements of the modern information system is composed of four M's. These are - 1) Men 2) Materials 3) Method 4) Machines. [9] The material resources may include the sources of information and the equipment required to handle the information. Again the sources of information is of two kinds:

1. Formal sources of information;
2. Informal sources of information.

In information system only formal sources are taken

into account which include books, periodicals, research reports, dissertations, thesis, conference proceedings, microfilms, whereas informal sources such as private correspondence, personal diaries, informal discussion etc.

Science and Technology :

The crucial role of science and technology information in the socio-economic and cultural development process needs no further demonstration. It has been frequently been recognized in the course of various international events such as the United National Conference on science and technology for development (UN CSTD), which met in Vienna in 1979. A trend of opinion has nevertheless developed concurrently which points to the under-utilization of existing information and voices the need for a new approach to these matter by international organization.

Science and technology is an indispensable factor for the attainment of national goals as it interprets knowledge into fruitful applications for the benefit of human society. Scientific and technical (S & T) information also plays a vital role as the basic input for all decision making activities in transforming the blue print

for socio-economic development into action. [10]

National Information System:

The national information system is the means of achieving national objectives through economic and effective utilization of information in technological innovation, decision making, research and education. [11] The rapid growth of information and the increasing number of people who require information demand the development of a suitable national information system on a priority basis.

It has been observed that advanced countries of the world have also realized the need of having a large number of information centres. They find it imperative to evolve a national system to maximize the use of their information resources. USSR and a number of socialistic countries have set up well-integrated national information systems. France, Federal Republic of Germany, United States, Canada, Australia and Japan are also engaged in the organization of suitable national information systems to suit their needs. [12] In India a National Information System for Science and Technology (NISSAT) programme has been established

during the 5th Plan period (1974-75 to 1978-79). [13]

It is hoped that NISSAT, when fully developed, would enable the country to meet effectively, economically and expeditiously the information demands of scientists, engineers, technologists, managements personnel, technicians, the government the industry and business, etc. at all levels and in all varieties of organizations, projects and missions.

Prof. Peter Lazar opined that the National Information System (NIS) should be based upon the existing information networks and services and thus should become an integrated National System, by making full use of the information potential of the country by coordinating the activities and organizing the co-operation of the individual services and networks according to well defined guidelines and well founded decision of labour. [14]

- (i) By filling up the existing lacunae in information services by establishing new services.
- (ii) By introducing and developing modern information technology and managerial methods in information work.
- (iii) By developing and applying internationally compatible national standards for information techniques and methods.

Thus information has come to occupy an increasingly dominant economic and social role in our society. It is regarded as a vital resource and input in all spheres of development and growth of a country and an effective information system is increasingly considered as a prerequisite for the national developmental programmes.

Though Japan has not developed adequate national document and information handling system despite its remarkably advanced industrial achievements, but recognition has been signalized by the establishment of the science and technology agency in the Prime Ministers office in May 1956 [15] and in August 1957 under the supervision of the Agency the Japan Information Centre of Science and Technology was established (JICST). The JICST aims to be the central organization for information activities serving the advancement of science and technology in Japan. [16]

To achieve for the development of society and effective implementation of the various plan programmes a well planned information system is required. Whole hearted attempts should be made to co-ordinate, channelise

and disseminate information to the whole society in an acceptable and assimilable manner. A co-ordinating agency for co-ordinated supply of information, a strong information system (NIS) to guide the decision makers, a full fledged central library information centre able to provide timely reliable, processed data are a must to lead to the attainment of the set objective. [17]

Objectives of the National Information System:

The objectives of the national information system may be stated in general as under: [18]

1. Promote awareness in educational policy makers of the services of the information network
2. Set up appropriate links with all operating centre
3. Arrange for its national environment a common set of procedures for the information exchange between all institutions and individuals concerned
4. Ensure the optimum utilization of accumulated knowledge in science and technology in order to achieve national objectives

5. Promote national and international co-operation on the exchange of information and expertise ;
6. Information network (i.e. thesaurus construction and maintenance and the monitoring of national information flows) and
7. Focus the attention of governments and private organizations on the problems of information availability and use.

Inputs to the systems

Professor A Neelamegham and M A Gopinath in an article of DRTC Seminar have described the inputs which form the components of the NIS as follows: [19]

1. The variety of information and their respective sources;
2. The variety of users of information- such as, academic and research personnel at all levels, management personnel in all institutions, and the governments;
3. The science and technology of selection, processing, organization, retrieval, and dissemination of information, and feedback on the services;

4. Human resources - such as, the professional expertize, managerial expertize, and other skills- needed in the design, operation and development of the systems; and
5. Financial resources and other material facilities.

Functions of the National Information System:

Arutjunov, N B in one of his articles [20] mentioned that the main function of a national information system is to supply the scientific and technical information operating at national, regional and international level, due consideration must be given in setting up, improving and developing the various information systems, to the need for compatibility in regard to the collection, processing, retrieval, dissemination scientific and technical information needed by specialists working in administration, in research and planning, in industry and agriculture and in the trade, service sector, i.e. in particular all spheres for the national development and author further classified the main functions of the national scientific and technical information as stated below:

- a. the preparation and distribution of primary, scientific and technical information;
- b. the recording and registration of scientific and technical information obtained via conventional and non-conventional channels;
- c. the selection, systematization, storage and retrieval of primary documents (creation of stocks of reference material);
- d. the processing of primary documents;
- e. transfer of scientific and technical information to the users;
- f. organization and operation of the system ;
- g. administration of the system;
- h. to develop the existing information systems. Their information resources and service, and provide new ones wherever necessary according to the present and future requirement of users through cooperative acquisition, processing and storage of information resources and the application of latest information technology for analysis, retrieval and dissemination of information;
- i. to facilitate efficient and economic inter-lending of information resources;

- j. to establish centralized data bank for quick information services;
- k. to develop and use efficient tools and techniques of document and information handling;
- l. to build up expertise and provide for education and training for an adequate number of professional personnel of different categories in library and information science.
- m. to secure adequate service conditions and status for library, and information science personnel;
- n. to participate activity in research, development and innovation in library and information science to enhance both the efficiency of information services and the quality of information provided by these services;
- o. to establish standards in materials, techniques and services for use of the components of the system;
- p. to co-ordinate and communicate the resources and series of the components of the systems for their effective utilization through union-catalogues bibliographies, current awareness services, indexing and abstracting services.

Need For NIS :

The national information systems is the media of achieving national goals through economic and effective utilization of information by which coordination and resource sharing could be effected for the mutual benefit of each of the existing libraries. The scientific and technical literature being a vehicle of information communication is posing a serious problem due to its exponential growth. It has been observed that at present about 3 to 4 million articles appear each year in some 30,000 significant journals [21] with growth rate of 8 to 10% . [22] A scientist who has only a limited time available for reading, on the average about 3,000 articles per year and reads 10% of these in detail. [23] The apprehension was voiced by a scientist no less than the renowned British physicist J D Bernal who said that it was some times easier to rediscover a phenomenon than to learn from literature that it had been discovered earlier. [24] This calls for organization of information systems on more sound basis so as to meet the challenge thrown by the information explosion. Therefore, a planned approach to systematize the information ensuring that the gaps are plugged, and a free flow and exchange of information is permitted, would effectively contribute to a total pool of information on a centralized basis.

And as such the creation of a national information systems is the only practical solution to provide free flow and exchange of information at optimal cost. " The primary aim of any information system is to render effective information service to the scientists and researchers based on their actual needs, a periodical evaluation of the service given by the systems is essential".

[25]

Planning of NIS:

Planning at the national level is recognized as an outstanding and continuous feature of all managers. It involves the systematic study of existing resources, pointing out present and future requirements, stating objectives and organizing activities to achieve the stated goals and without which no system can work properly and efficiently and therefore, planning of an information system at national level is essential to ensure economic and effective utilization of the resources and fulfil the present and future requirements of the scientists, researchers and technologists of the country. " Planning is the basis for control: without plans, effective control is impossible. It is important to recognize

quickly deviations from plans, and to take steps to minimize their effect". Surendra Nath Mahta described the following advantages [26] in planning national information system.

1. Planning helps to move systematically towards the achievement of objectives of the system.
2. Planning helps in clear demarcation and allocation of activities among the components of the system and effectively controlling the course of action towards achieving the objectives of the system.
3. Planning provides a systematic approach to the development of resources and activities of the system.
4. Planning avoids duplication of efforts, and provides improved and economic services to large number of users of the system; and
5. Planning will draw an integrated and analytical projection of future course of action for the achievement of goals of the information system.

It is said in one of the Unesco's publication that planning of the information services calls for a

partnership between suitably qualified senior staff and planners concerned with educational, social and economic development. The training of information service planners sufficiently familiar with socio-economic problems, national education plans, the impact of science and technology on the modern world, conditions and trends in the production of books and audio-visual materials, and the use of interpreted statistics, may radically modify the course of development of information services. Some familiarity with planning methodology, as it relates to information service, is necessary for the senior staff of information systems and for national planners. [27] Therefore planners are concerned with scientific and technical educational economical and social development of the nations and as such a strong representative central body is indispensable for making coordination and efficient and effective planning and that of the development of national information system. This central body/organization would stipulate the objectives and functions, structure and services of the system and provide an assured basis for development of resources and services.

Resources of the NIS:

The most valuable fixed assets of any information

system are the information stores, where most of the potentially available knowledge is collected ordered, stored and prepared for retrieval. The existing resources of the system include the existing resources of libraries, documentation centres and information centres, their manpower and financial resources, their facilities and services for access to information, facilities for training of personnel in librarianship, documentation and information science.

For construction a national information system, the planners have to give emphasis to the following: [28]

1. Financial resources;
2. Manpower resources; and
3. Information resources.

The information resources will include:

- a. Allocation of responsibility to various components of the system;
- b. Ensuring that at least one copy of each available worth-while document is made accessible;
- c. Establishment of efficient national lending library services;

- d. Provision should be made for adequate reprographic and translation facilities;
- e. Establishment of new information centres;
- f. Development of necessary tools and techniques for efficient and economic processing retrieval and dissemination of information;
- g. Maintaining cooperation with other national and international organizations engaged in information services.

Manpower Resources:

Manpower training for effective operation of the various components of a national system of information services requires that specialists of many kinds should be available; subject specialists, information professionals, system designers, and other, once policy has been set, operation are carried out by those specialists who are most effective for the tasks performed, however, all tasks that require judgement on the value of information in a given field must be made by some person of required professional qualification and training. This principle cannot be stressed too strongly. [29]

Plans for a build up of the requisite personnel should form a permanent element of the system design, which include: [30]

- a. a medium-term plan (for the next 5 years) with provision for annual growth;
- b. the qualification required of the personnel- graduates, under-graduates, and others;
- c. summary of the foreseeable demand for training personnel for specialized centres in agriculture, industry medicine etc.

T.N.Rajan in one of his articles [31] of the national information centre is most welcome, which is the right step in the right-direction. He also said that the task of designing, organizing and operating a national information system is indeed challenging that calls for great ingenuity, imagination and expertise. The different type of specialized skills that are required for the establishment of a national information system, are not readily available. Manpower development is therefore, important task, on which lies the success of the establishment of a national information system.

NATIS Statement:

International cooperation in library and information manpower development has been an important aspect engaging the attention of several international organizations, such as FID, IFLA, UNESCO, etc. With the emergence of the UNISIST and NATIS programmes in the 1970s, international programmes for raising manpower in the field are being intensively promoted.

The Intergovernmental Conference [32] on the overall Planning of National Documentation, Library and Archives Infrastructures (Paris) 1974 recommended that :

1. Planning manpower resources and forecasting future needs should be considered at the national level by the appropriate government agency in consultation with the profession and other interested bodies. International and other appropriate standards and practice where these are applicable, should be taken into consideration.
2. For this purpose, the appropriate government agencies should undertake or promote regular manpower surveys for different levels of professional and

non-professional personnel in library, and information services, following the standards set by the Unesco Census of Documentation and Library staff.

3. Based on these surveys national programmes for the education of professional personnel should be established as the principal means of supplying adequate manpower for libraries and information services, and that these professional educational programmes be run as an ongoing national commitment.
4. The training programmes for high level professional personnel be undertaken where possible. This can be appropriately supplemented by an international exchange of professional experience and by inviting experienced teachers from other countries.
5. Professional education in the fields of libraries and information services should be imparted in universities or in similar institutions of higher learning.
6. The basic professional curricula should be formulated at a level consistent with that of other university programmes of graduate standing.

7. There should be suitable courses for sub-professional/para-professional staff, which should be normally organized in the middle-level (vocational) training institutions, but which may be given at the schools of university status where this is necessary.
8. These programmes at professional and sub-professional levels not only include initial courses and advanced studies, but also specialized short-term re-training facilities.
9. Provision should be made for post-experience courses and seminars to enable professional and sub-professional personnel to continue their education, to exchange experience, and to increase their professional competence.
10. Appropriate status be accorded to professional personnel in the field of libraries, and information services appropriate to the level of education and in line with other professions of equivalent standing.
11. There should be a suitable administrative machinery for supervising professional standards in recruitment of professional education and practice, either by a professional organization or by a government or similar official agency.

Financial Resources:

The development of the national system of information services means longterm cost-intensive investment which yield the result "Information" only after a comparatively long starting period. [33] Planning of the information system for financial facilities require to get more funds available from various sources and to obtain highest benefits from the available resources. But it is also a fact that financial situation, the priorities, the number of available trained personnel and attitude of those responsible personnel for decision-making etc.etc. differ in each country when financing the project for the establishment national information system.

One of the important facts is the limited financial resources of developing countries and the consequent emphasis on economy in the creation of their national system of information services. The only feasible solution is from the national budget supported by national agencies. The need for technical assistance from international organizations and the industrialized countries may be sought. This assistance can successfully bring the information services of a country to life, and may also help

in the designing of information systems and the acquisition of expensive equipment. The actual operation of the national information system, should be in the hands of the country and it should be maintained by the country's own financial budgets of academic and research institutions financial contributions from direct taxes and payments from users. [34]

The role of governmental agencies in the sphere of information service is an important point. Here recommendation 15 of the UNISIST feasibility study may serve as a guideline.

" A governmental or government - chartered agency should exist at the national level to guide, stimulate and conduct the development of information resources and services ... " [35]

In the opinion of others that one governmental agency should be held responsible to the entire system of information services. Individual administration of sub-systems, though possible would not be efficient, whereas the UNISIST recommendation, though it can be met by such an arrangement, permits a variety of less centralized arrangement. [36]

UNISIST, as part of the Unesco programme, recommends the establishment of national focal points with policy and planning functions involving stimulation, financial support, and co-ordination of information activities [37] the solution must depend on the division of governmental functions in each country.

Structure of the NIS:

The analysis of reports and experiences from the developed countries of the world emphasized to establish and build up a system of national information services, using a systems approach which would consist a comprehensive design of the information system, its links, internal and external relations, functions, ways and means of operation; which is to based on both the present situation - its gaps and strengths and the future tasks of the information system. The way how information systems evolve and transmit into networks or a coordinated system is graphically shown in appendix-H . Organizational links between such services might be designed as part of a national system centrally co-ordinated for operation and development. Figure appendix 'I ' is a hypothetical example. [38]

The design of the system will be a painstaking and time-consuming task. A system design for information services would contain these main elements: [39]

- a. analysis of the information needs of the users taking into consideration the present and estimated figures of potential users, their classification according to qualifications and specialization;
- b. analysis of the present situation of library holding and information services;
- c. to design of the main links of the system which are to form a network in the country;
- d. estimation of the number of personnel necessary for the system of services, classified according to the annual growth-rate, and qualifications, together with a plan for training, both at home and abroad;
- e. a design for the provision of space, materials and techniques, with emphasis on correlations between the technical equipment and the individual links of the system- especially important when the computing, communication and reprographic technologies are gradually introduced;

- f. a planning and development policy statement which would stress information policy objectives and cover legal and economic problems;
- g. planning of financial means for the realization of the system, in which allocations both from the state and from other sources, e.g. industry or institutions, are combined;
- h. creation of an activation mechanism, such as the establishment of a national focal point and a UNISIST national committee.

The development of a network may involve close cooperation of several government authorities. As shown in Figure (appendix-I) such networks would involve various levels of government authorities and private centres. In a smaller country, many of the functions would be performed by a single unit. The evolution and reasons for change of individual centres into a network are best illustrated in Figure (appendix-H). Actually there is no generally valid or definite model for information system. It has been experienced from the developed countries that the solution depends on many factors, but it depends upon the development of the

country's structure and its political, social environment and particularly an economic condition.

The problem can be solved gradually as in the initial stages, a country when building up a system of services, will certainly establish a national centres or centres. And subsequently in the later stages, when the country developed in scientific and technically, some of the services may be decentralized and specialized and or regional/sectoral centres may be established for the greater benefitted of the user. Here some main links which have been described for the design of a national system for information services in the "Handbook for information systems and services [40]" are as follows:

1. state authorities for planning and coordination of system of services in a country;
2. a national centre (or centres) for data, documentation, and referral;
3. a network of specialized (subject or mission) information and data services which would be gradually built up according to the needs of

economic, scientific and technical development; they could include state-run centres and specialized centres of private enterprises, industrial centres, centres of agricultural research, etc.;

4. a national network of information collections, either independent or integrated with other services that have lending arrangements to cover information needs in special technical and scientific fields.
5. service centres to handle specialized materials and primary publication services such as patent literature standard literature, translations, etc.

In the above section, figure 'B' (appendix-I) shows a hypothetical example of the linkages in a hypothetical national information service. Besides, two more Schematic Diagrams of NIS are shown in appendix-J and K .

Dr. Peter Lazar , as an Unesco expert prepared NISSAT plan for India where he has mentioned the following should be the organizational structure of the NIS, these should be [41]

Local Information Units:

Local information units (special libraries, information units, etc.) should be established in every research and development institute, industrial or business firm, government agency, etc. with the task of providing all scientific, technical and economic information necessary for the functioning of the parent body by relying upon :

- a. the LIU's own information sources, and
- b. the services of the information units at higher levels (branch information centres, regional information centres, national information centres).

Branch Information Centres (BCs) should be developed from the most suitable LIU of a branch (scientific discipline, industry or other technological branch, etc.) with the task of providing subject-oriented (mission oriented or discipline-oriented) information.

There can be as many subject or mission-oriented systems (Networks), managed from one or more centres, as there are groups or users. Often the following

differentiation can be made [42] :

Subject-Oriented Networks can include:

Scientific and technological information networks for:

Physical Sciences

Life Sciences

Technology

Interdisciplinary areas;

Mission-Oriented Networks can include orientation towards:
public services; health and medicine, transportation and
communication, defence, housing, education, socio-economic
services, other national services.

Branch Information Centres (BCs) [43]

According to Dr. Peter Lazar in context to India:
The Branch Information Centres (BCs) should be developed
from the Local Information Units of a branch such as
scientific discipline, industry or other technological
branch etc. Branch Information Centre will provide
subject-oriented information for :

1. all institutions belonging to the branch ;

2. other institutions interested in particular subject information related to the branch, especially government agencies and national information centres and
3. individual users.

The BCs should build up and maintain a document collection supplementing those of institutions of the branch including in particular specialized indexing and abstracting services and unpublished literature and would coordinate the acquisition of the branch institutions, in cooperation with the Regional Centres and National Centres.

The main role of the BCs is to provide the following services:

1. Specialized current indexing and abstracting services, including SDI Services;
2. Subject bibliographies;
3. Subject Union Catalogue;
4. Information retrieval on request;
5. Information on patent specifications, standards etc.;

6. Information on scientific, technical and economic data;
7. Business and market information; and
8. Preparation of surveys, state-of-the-art reports, scientific and technological forecasting and other types of techno-economic and special management information services for the Branch.

The BCs should build up data banks of data relevant to the activities and the development of the branch and the BC's may supplement the activities of the Regional and National Centres in:

- a. document procurement;
- b. specialized translation service;
- c. training of users in documentation;
- d. research and development in information work.

The BC's should be entrusted with the responsibility for the co-ordination of information services within the branch, and also assist the establishment and development of the other branch information units by assisting advices, information system analysis, design etc. and also co-operation with national and international professional bodies.

Sectoral Centre: (SC)

In an articles [44] it has been found that there may be Sectoral Information Centres(SCs). All the major S & T areas will be classified into sectors based on disciplines, missions or products. On the lines shown in the existing discipline, mission or product-oriented information centres will be selected as the NISSAT Sectoral Centre to cater to the information requirements concerning the particular discipline, mission or product. Such a sectoral centre will coordinate with all the remaining information centres (which will be called Local Information Units (LIUs)) in that particular area. The Sectoral Centres will generally be part of a National Research Laboratory doing R & D work in the particular discipline, mission or product so that the services of subject specialists are readily available to the sectoral centre for abstracting, information analysis etc., and there will be better utilization of the information facilities and products created by the centre. An existing information Centre selected as a NISSAT Sectoral Centre will be up-graded to provide services at National level by augmenting its services and facilities, for which

finally support will be provided by NISSAT if necessary.

As the first phase of NISSAT's activity the following four information centres have been selected for funding and up-grading as the NISSAT Sectoral Centres:

1. Leather Technology : Central Leather Research Institute, Madras
2. Food Technology : Central Food Technological Research Institute, Mysore.
3. Machine Tools : Central Machine Tools Institute, Bangalore
4. Drugs & Pharmaceuticals : Central Drugs Research Institute, Lucknow.

It has been decided that every year more such centres will be planned for up-grading as the NISSAT Sectoral Centres.

Regional Information Centres (RCs):

Dr Peter Lazar mentioned that there should be Regional Information Centres (RCs) and RCs should not be subject oriented. The main role of the RCs would include:

1. to survey the information sources of the region and to organize their mobilization for covering the information demand of the region;
2. to establish a large reference collection for the use of the region;
3. to supplement the acquisition of the BCs and LIUs of the region.
4. to establish, maintain, up-date and publish Regional Union Catalogues;
5. to establish a strong reprographic unit and to serve the region with reprographic copies of information sources;
6. to procure, on request, documents within and outside the region;
7. to prepare and publish current awareness services on special types of unpublished literature, particularly university thesis and dissertations.

It is also clearly mentioned by him that the regional union catalogues and the current awareness services might be prepared by computer-based operations forming at the same time output for the region and input for national services to be developed by the national centres.

National Information Centres:

Dr. Peter Lazar as a Unesco expert for preparing a report as a National Information System for Science and Technology for India in 1972, mentioned that National Information Centres (NICs) would be responsible for co-ordinating, organizing and providing information at national level for large sectors of national activities, and in the case of India, the National Information Centre would include the following centres organizations of the country: [45]

1. The Indian Scientific Documentation Centre (INSDOC) for Science and Technology;
2. The National Medical Library(NML) for medicine and health;
3. The National Agricultural Library(NAL) for agriculture;
4. The Defence Scientific Information and Documentation Centre (DESIDOC) for the defence sector;
5. The Library and Information Division of the Bhabha Atomic Research Centre for nuclear science and its application; and
6. The Patents Library and Information Centre of the Patent Office for patents.

The NCs are mission-oriented centre.

Tasks of the NICs:

The NCs, forming part of the NIS, should include the following responsibilities: [46]

1. to co-ordinate the activities and the development of the branch information services falling into their competence;
2. to co-ordinate the preparation of annual and medium-term plans for the branch information services;
3. to maintain and develop national document collections serving as the national basis of information work (National Science Library), National Agricultural Library)
4. to establish and develop a national co-operative acquisition scheme for the coverage of foreign literature needed for the development of the country;
5. to establish a national union catalogue based upon the integration of regional union catalogues;

6. to establish and maintain data banks containing data relevant to the activities and the development of the sector;
7. to prepare and publish current awareness services on Indian journal articles (indexing and abstracting services) and on selected foreign literature either bearing interest for several branches or in fields where BCs do not yet exist.
8. to establish and maintain translation services based partly on their own staff and on external collaborators using the specialists subject and language knowledge accumulated in the country;
9. to procure documents, on request, from within the country (based on the regional centres) and from abroad;
10. to provide reprographic facilities for copying documents and distributing information;
11. to organize information retrieval services (including data retrieval based upon their own holding and data and on the utilization of information services available on magnetic tapes;
12. to co-ordinate and to organize training in documentation both for librarians and documentalists

and information, and to support research projects, with special emphasis on the transfer and adoption of advanced technology in the country;

14. to provide methodological guidance and advisory services for RCs, BCs and LIUs;
15. to prepare and issue methodological guidelines and instructions, and to control their applications;
16. to maintain and develop relations and co-operation with foreign national information centres and other institutions providing sources of information especially Indian, foreign and international professional associations, learned societies, etc.

National Science Information Policy:

Scientific and Technical information is beginning to be regarded as a vital national resource. In developing countries governments have a major responsibility for providing information services. It is required to be assured that all available scientific and technical information is fully exploited by scientists, engineers,

industrialists, policy makers and all others having a need for information. To achieve a national information system, a national information policy should be formulated by the government which would cover the following: [47]

1. allocation of responsibilities to organizations for building up strong collections in special subject fields;
2. ensuring that there is in the country at least one accessible copy of every worthwhile scientific publication for use by the scientists;
3. development of facilities for providing information services to industry;
4. establishment of a data bank for scientific and techno-economic information;
5. organization of a national lending library service on the lines of the National Lending Library at Boston Spa in the United Kingdom;
6. establishment and development of subject-oriented national information grids;
7. establishment of a national referral centre to direct the users to existing information sources;

8. preparation of national union catalogue of holdings of libraries;
9. establishment of regional dormitories for storing older material weeded out by service libraries;
10. promoting the use of microfilms and microfiches of documents;
11. creation of information consciousness among users;
12. undertaking periodical surveys for assessing information needs and uses in the country;
13. collaboration with national and international organizations engaged in information service;
14. building up translation facilities in various languages;
15. building up adequate computer facilities for information handling;
16. building up adequate reprographic facilities in information centres;
17. building up of expertize and provide for training in information field for an adequate number of persons in documentation, information science, communications computer science, reprography and translation;

18. ensuring that the service conditions of the information personnel are on par with those of scientific personnel;
19. supporting projects in documentation, information science, communication, computer science reprography and translation;
20. supporting research programmes in documentation, information science, communication, computer science, reprography and translation; and
21. sponsoring conferences, symposia, seminars, workshops, etc. in documentation, information science, computer science, communication, reprography and translation.

We have actually entered the information age. This has become possible as the technology is growing at a very fast rate. Over and above all this, it is necessary to sort out some of the problems pointed out by Grawford [48] before finalization of the National STI policy. After sorting out the problem the planner has to define the role and assign the responsibility of implementing the national policy for organizing a suitable communication channel for sharing resources of the co-operating network libraries to an apex body, whether a

public body or a private enterprise. [49] Further, this apex body will be responsible for establishing contacts and extending co-operation with other national and international STI organizations.

Among the other important tasks, co-ordination and standardization of STI terminology and construction of the structure of the data bases from the entire literature input published within the country and finally centralized planning for the selection compilation, storage, integration, location and retrieval of the exact information for the totality of the information content of the STI system for all members of the co-operating libraries. [50] An economical scheme of resources sharing of scientific and technical literature of the libraries located in the country based on the concept of National Information System has been suggested by means of creating 5 operating centres and one Central body at the apex to serve as co-ordinating agency for Bangladesh.

II

PROPOSAL FOR NETWORK IN BANGLADESH

The Government of the People's Republic of Bangladesh has shown continued interest in the library movement, and by the Government Order No. 5X/11-17173/400/3(9) dated 3.10.1973 appointed a "Committee for Development of Libraries and Library Science in Bangladesh"

with Mr Md Jakaria, Joint Secretary Ministry of Education, Cultural Affairs and Sports (Now Ministry of Cultural and Religious affairs) as its Chairman, with the aim of examining the problem of different types of libraries in Bangladesh. The committee at its meeting on 10 September, 1973 formed 4 sub-committees for (a) National Libraries, (b) Public Libraries, (c) Academic Libraries, and (d) Special Libraries. [51]

A significant development has also been observed in the field of scientific research, which was the creation of a new department of science and technology under the cabinet secretariat, government of Bangladesh, with the Government Order No. S-iv/2/172/79 recognizing a national science and technology policy embracing essential responsibilities such as planning, budgeting, coordinating promotion, execution and proper evaluation of scientific and technological activities relevant to country's needs.

There has been a considerable expansion of research activities in the scientific departments and institutes in Bangladesh such as science departments in six (6) universities of the country, one of which is exclusively devoted to agricultural sciences : three (3) regional laboratories at Dhaka , Chittagang and Rajshahi under the

Bangladesh council of scientific and industrial research;
centres of advanced study in science subjects; 20
Agricultural research institutes/ organizations under
different ministries of Bangladesh including Bangladesh
Agricultural Research Council (BARC); 22 Medical Institutes
and Colleges under the Ministry of Health services; 18
Engineering and Technological Institutions/ Colleges
excluding seventeen Polytechnic Institutes and 23 voca-
tional training institutes; Dairy Research Institute;
Veterinary Research Institute; the Water and Power Commi-
ssion; the Meteorological Department; Geological Survey;
Botanical Survey; the Geological Survey of Bangladesh;
recently established National Science Library of Bangladesh
under cabinet secretariat of Govt. of Bangladesh. All
the above mentioned organizations institutions have their
own libraries and some of them having prestigious libraries
including 6 universities. At present there are nearly
100 special libraries attached to various government and
semi-government departments; learned societies research
institutions; professional associations; press; business
and industrial firms etc. 3 British Council libraries;
4 USIS libraries one each at Dhaka, Chittagong, Rajshahi
and Mymensingh Districts of Bangladesh; 3 Government Public
Libraries, one each at Dhaka, Chittagong and Khulna
districts; besides there exist Bangladesh standards insti-
tutions (BDSI) and Bangladesh Patents office.

It is fact that though Bangladesh houses a large number of research institutions including 6 universities and all of them possessing good libraries, but lack of information network is prevailing among these libraries as well as in documentation and information centres. It has been discussed in the previous sections about the necessity for the establishment of national information system for science and technology which is the recent new stage of the development of information services (in short NIS).

In recent years, due to enormous proliferation of scientific literature, it has been found helpful to organize the national information system in the form of decentralized units, each unit devoted to a particular subject such as information networks for engineering and technology, networks for medical science, network for agricultural science etc.

Prof Peter Lazar, in one of his report [52] said that the National Information System (NIS) should be based upon the existing information networks and services and would become an integrated national system:

- a) by making full use of the information

potential of the country by co-ordinating the activities and organizing the co-operation of the individual services and networks according to well defined guidelines and a well founded division of labour;

- b) by filling up the existing lacunae in information services by establishing new services;
- c) by introducing and developing modern information technology and managerial methods in information work;
- d) by developing and applying internationally compatible national standards for information techniques and methods.

The initiative for the establishment, the National Information System (NIS) should be encouraged, planned and co-ordinated at government level by the recently formed National Council of Science and Technology (NCST) Government of Bangladesh, taking into account both the uniform goals to be achieved and the standardized methods to be used by the system according to well defined guidelines.

The concept of systematically organized scientific and technological informations in general has not yet fully

developed and still contributes a minor role in the general flow of communication system in Bangladesh. Scientists, researchers and technologists are therefore not yet very familiar with things information system. " Since utilization of information is a basic concept in the communication process, there is a need for considering " Dissemination of information' as a factor in the planning of an information system". [53] The science and technological division, of the recently formed National Council of Science and Technology ,Government of Bangladesh recommended for an agency designating " Information Documentation and International Cooperation Wing" for Bangladesh. [54] The newly proposed plan of the NCST of Bangladesh has been shown in appendix ' L '. In this context it may be proposed that this newly formed information wing of Bangladesh may be regarded as a coordinating agency to interlink the existing and future information sources, systems and services in the field of scientific and technological information into an effective network. It is also expected that this agency would act as a central body in close cooperation with national international information dissemination agencies like NISSAT of India, UNISTIST, NATIS , VINITI of USSR. However, it has been observed that the envisaged goal of newly proposed plan for the establishment of the information documentation and international

cooperation wing by the NCST, will sometime to materialize. In the meantime it may also be proposed that a proper infrastructure based on existing national-wise resource network system should be worked out which is the pre-requisite for the development of the national information system for science and technology.

It is useful here to begin by delimiting the meaning of some basic and frequently used terms:

Network:

A network is a formal organization of group of libraries and information centres following some common pattern or design for information exchange and communication with a view to improve efficiency and effect economy in an overall manner. It is an assemblage or a combination of information centres and services forming a unitary whole. Network implies pulling together sub-sets of information centres and libraries in order to act in a concerned manner with pre-determined obligations. It offers a potential for increased access to larger resources and for a greater measure of service than the sum of all the constituent parts. Network is now identified,

especially in western countries more as interlinking of automated library and information systems through communication channels. [55]

T.S. Rajagopalan said that old practice of library cooperation may be regarded as a forerunner of this days concept of networking. Library cooperation is both informal and voluntary is largely the initiative of professional people. Afterwards coordination began to be emphasized. It is more formal than cooperation and stands for harmonious combination and resource sharing and facilities in order to avoid duplication.

Why Networking? [56]

The growth of information gives rise to financial pressures on libraries and information centres which forced to coalesce a network in order to share the resources rather than duplicating them, so that the sum total of the book purchase fund of the country is stretched farthest to obtain maximum number of titles. The high cost of reading materials as against tighter budget does also force libraries and information centres to form networking and resource-sharing.

To-day a large number of users are to be served by the libraries and information centres than before and at the same time the requirements of the users are becoming more diverse. And to satisfy the user it becomes imperative need for widening information coverage, extending the sphere of service and accelerating the speed in the supply of information which necessitated the formation of networking to cope with this complex situation. Computer application in library and information work and machine-readable data bases has rendered possible on-line interactive user oriented information systems. All these scientific process has been evolved replacing old technique of librarianship for an advancement in building up information handling capability.

Networking may also be as a result of impact of international programmes such as UNISIST and NATIS and systems such as INIS, AGRIS and DEVSIS. National activities are required to be realized through networking and made compatible with international specifications to derive maximum advantage.

Types of Network: [57]

T.S.Rajagopalan further said that there are three types of network.

1. Organizational network: The public library system of a state is an organizational network.
2. Specialized network: The sectoral information systems planned under the NISSAT scheme are specialized network.
3. Functional network: The National Information Centre's plan of having a large computer configuration with a direct access secondary memory and connected to a number of institutions through communication channel and having terminal is a functional network.

The Research/Organization/Institutions in Bangladesh mentioned in the earlier chapters possess excellent libraries. The number of such libraries runs to over 100. It is also established fact that though Bangladesh has been progressing in establishing libraries

and documentation/information centres, but each library is functioning in isolation and there is lack of any information network by which coordination and interload/resource sharing could be effected for the mutual benefit for all existing libraries. Besides, there are not well organized and no efforts have been made at the conscious level for effective coordination of these resources for effective centralized utilization. Further there is no centralized facility for acquisition and processing of scientific technical, industrial and statistical data for being catered to the needs of the country. It is also fact that due to exponential rate of growth of scientific and technical literature and rise of cost of such literature every year by 25 per cent [58] or even more coupled with the problem of storage space and technical processing of the materials acquired in libraries and above all there is language barrier which aggravate the situation in consideration the multiplicity of languages in which the learned papers are published. In an article Joseph Becker said "sharing resources through networks enable a library not only to buy what it needs for its regular clientele but also to depend on the network for the specialized materials it may need only for occasional users". [59]

" The network of specialized information services and data centres in developing countries is undergoing gradual development. Special libraries are already established in most countries and are usually attached to government ministries or universities. Since special libraries play an important role in the integrated system of information services, the establishment of a network of these and other special information and data services is strongly recommended in the UNISIST proposal". [60]

Joseph Becker in one of his article said " The concept of a national network implies the interconnection of existing information systems and libraries through communication, and one of the great strengths of the nation is the great array of intellectual, scholarly, and research resources to be found in its libraries and information centres, without integration and close cooperation, however, these resources will remain a series of separate, insulated institutions". [61]

Therefore, it is an urgent need for the proper reorganisation of all available sources of information generators and holders within the country. To solve this lacunae, a proposal for an effective library and information

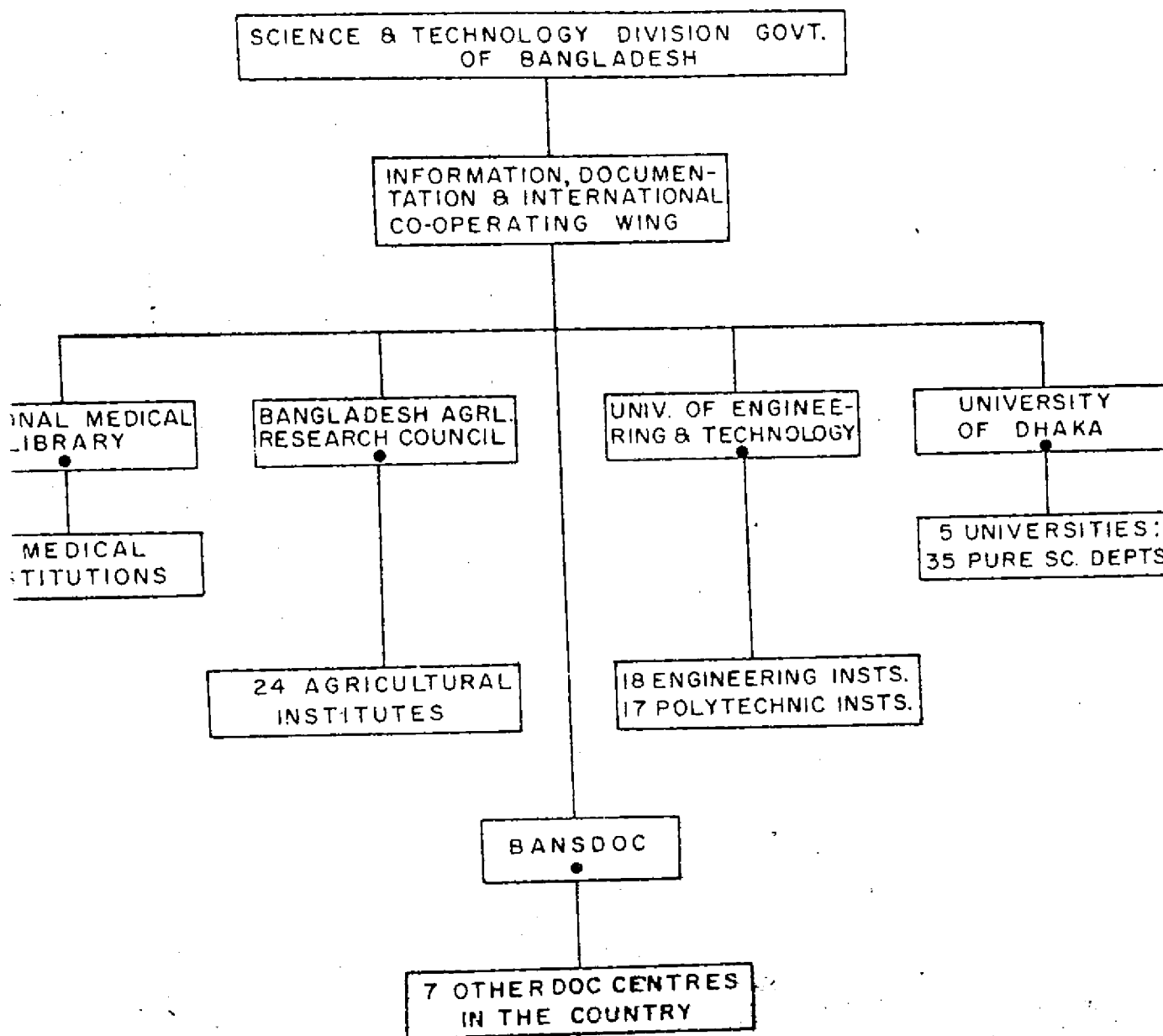
network for science and technology at the national level is suggested which will help providing required information to the users of science and technology.

The proposed network of information have been categorized in three distinct interacting levels for the country Bangladesh:

1. Local Levels;
2. National Levels;
3. International Levels.

Network which involves the participation of libraries of the country must have common fields of subjects like agriculture, medicine, engineering and pure science etc. Among the three levels, the participating libraries at the lower level where as the designated operating centre at the upper level.

It will be more clear if we take an example of the Agricultural University as an operating centre of the information system at the local level. It can be called central information unit for the local level. The various research institutions/ organization in the field of agriculture should act as the sub-systems of the

APPENDIX L.

• - Operating Centre

Figure : Organization Links for a Networks of Scientific and Technical Information Services.

main system. Then they can be called as Branch Information Units'. The Branch Information Unit (BIU) should serve the information requirements of the local organization or its vicinity. The Agricultural University which acts as the operating centre or central information unit at the local level, should also form direct link with the central centre at the national level which is regarded as the apex body. The operating centre in the country should utilize the resources held in participating libraries and it should also make available those materials which are not available in any participated library and above all there must be a centre/organization at national level for coordination of integration among the activities of the operating centres and should maintain close cooperation with other national, international information dissemination agencies like, NISSAT, UNISIST, NATIS, WINITX etc.

The following steps [62] should be considered for establishing an infrastructure for the national network which is the prerequisite for the national information system (NIS).

1. Suitable computer programmes may be written by mutual consultation of the operating

centres at a chosen centre preferably agricultural university, Mymensingh and which may be distributed to other participating centres to ensure exchangeability of punch cards/types;

2. A data collection formate has to be drafted with the mutual agreement for the sake of informations;
3. The operating centres will supply data collection forms to all the participating libraries taking in its jurisdiction and collect the data forms at regular intervals;
4. Cards will be punched, batch processed and print out taken, separately at all the five operating centres;
5. The information stored in each centre will have to be up-dated by a similar process, half yearly by merging current information stored on tapes at each operating centre.

In set up the network for science and technology in Bangladesh, the computer potential can be well utilized in creating operating centre. Each operating centre should be given the responsibility of storage of information on the subject fields allotted to it and it should be up-dated on yearly basis by processing new inputs. For the proposed network, subject-wise distribution of libraries under the different operating centres has been

Proposed subject specialization of different operating centres

Location of operating centre	Subject field to be covered	No. of participating libraries
1. University of Dhaka, Dhaka-2, Bangladesh	Pure Science, i.e. Physics, Chemistry, Mathematics, Botany, Zoology and Earth Science	5 Universities; 35 Science Departments of the Universities of Bangladesh (as mentioned in the appendix-M).
2. The National Medical Library, Dhaka	Medical Sciences	23 Medical Science institutions of the country (appendix-M).
3. University of Engineering and Technology, Dhaka	Engineering & Technology Sciences	18 Engineering Institution and 17 Polytechnic institutions and 23 vocational institutes of the country (mentioned in the appendix-M).
4. Bangladesh Agricultural Research Council, Dhaka	Agriculture and Animal Husbandry	24 institutions and departments (appendix-M).
5. Bangladesh National Scientific & Documentation Centre (BANSDOC), Dhaka	Documentation Centres	7 documentation centres of the country including National Science Library (appendix-M).

In the proposed diagram the apex body is the information, Documentation and International cooperating wing which has been recommended by the recent formed NCST (National Council of Science and Technology) of Bangladesh, would coordinate the activities of the above mentioned five operating centres and would maintain the close-cooperation with other national and international information systems of the world like UNISIST, NATIS, INIS, AGRIS, DEVSIS etc.

It is also being proposed here that for the establishment of the complete information network on science and technology in Bangladesh, the main source of necessary adequate funds should be made available from the government of Bangladesh and there should be provisions in the national budget of the country which should also be passed from the Parliament of the country. The Unesco helps the developing countries in the establishment of information centres and in the case of Bangladesh, the non-recurrent cost of the establishment of National Network system may be sought from International agencies like, UNESCO, UNDP etc.

As the government has emphasized the need for science and technology which is evident from a significant development in the field of scientific research, was the creation of a new department of science and technology in

1979, which may be called the executive arm of the national body to advice and assist the government in all matters concerning promotion of science and technology. In one article [63], it has been noticed that in order to face the the challenge of explosion of knowledge posed by the fact on an average about 1000 new books are published every day in the world in addition to some 33000 newspapers and 70,000 periodicals and to overcome the problems of acquisition, storage and dissemination of knowledge contained in 12 to 14 million documents produced each year, which according to recent estimate contain nearly 72 billion pieces of information.

The task of creating network for having a comprehensive listing of all the material available in the country or abroad being a gigantic one automation is necessary and for tackling the situation computer assistance is also necessary to solve the problem to a greater extent.

It may further be proposed here that after having materialized the above mentioned network in subject-wise distribution which is the essential components for the establishment of a National Information System (NIS) and these networks are the pre-requisite for establishing a National Information System for Science and Technology in Bangladesh.

The NCST (National Council of Science and Technology) of Bangladesh would emphasize on information system on Science and Technology formulating a National Science Information Policy for Bangladesh. "Information policy is a major component of policy for Science and technology. Just as science policy must be an integral part of overall government policy, linked to social and economic affairs, information policy must seek to assure that world's specialized and professional knowledge is fully and properly used in guiding social evolution." [64]

" The primary object of an information policy is to provide research workers, scientists, engineers, technicians and managers and more generally all who have some part to play in scientific activity with access to information they need and this as economically as possible." [65]

The basic plan of action is to build a national information network on the existing infrastructure by coordinating present activities, articulating the various services, developing their strong points encouraging private and public initiative and filling in existing gaps. The government should clearly state its area of responsibility and the means it intends to employ such as specialized services, incentives, coordinating machinery, financial arrangements. An essential approach to science information dissemination

processes at the National level is to enrich the information resources and optimize their utilization by all those who need to use information.

This study also suggest that the information system or networks for Bangladesh should be taken into consideration in the context of the NISSAT programme of India which comprises of several tiers (it is elaborately discussed in the third chapter of this thesis). The NCST or IDIC (Information, Documentation and International cooperation) of Bangladesh under Science & Technology Division would work towards the evolution of National Information Policy , Major Science agencies in the country are constituents of the network/system. However an Advisory Committee consisting of Science planners, administrators, scientists, librarian, information scientists, documentalists, drawn from various science agencies such as the BCSIR, BARC ,BMRC,SPARSO,BAEC, the University Grants Commission, Defence Research Organization, the Patents office, the Bangladesh Standards Institution, the Planning Commission and other government departments dealing with science subjects may be constituted to formulate programmes and assign priorities and to evaluate performance.

In Bangladesh, one national centre alone cannot effectively exploit literature resources scattered all over the country. By establishing Regional Centre in major centres of scientific and technological activity it would be possible to aim at a greater utilization of our literature resources. BAMSDOC should take step in making proposal for establishing three more Regional Centres in Chittagong, Rajshahi and Khulna Divisions of Bangladesh. (shown in map of Bangladesh, appendix ' N ')

While the information network will be established at par' parallel line of the NISSAT programme of India, all the major S & T areas should be classified into sector based on disciplines, mission or products. Mission or product-oriented information centre will be selected as the NISSAT Sectoral Centre to cater to the information requirements concerning the particular discipline. However, in Bangladesh for the initial phase of the information system as a Branch Information Centre or Sectoral Information Centre, the following discipline should be taken into hand :

1. Jute Technology;
2. Ship-building Technology ;
3. Fishery and Food Technology and
4. Drugs and Pharmaceuticals

To begin with, Branch Information Centres (BCs) could be developed in major industrial disciplines. And as such at least the above mentioned four areas is suggested for being taken up during the 4th 5 year Plan of Bangladesh which will be started from 1985. However, after materializing the project as proposed, by the end of the plan period the more such other disciplines or areas are to be taken into consideration every year as a Sectoral Centre of the National Information System of Bangladesh, following the well developed guidelines of UNISIST.

The success of the planning and implementation of this project undoubtedly depends mainly on the support enthusiasm and cooperating through working and coordination among all the professionals, educators engaged in the participating libraries of the project and the government as well as non-government agencies responsible for the maintaining of various libraries/ information centres for science and technology existing throughout the country.

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CHAPTER V

CONCLUSION

CHAPTER V

C O N C L U S I O N

From the study made in the previous pages, it becomes an established fact that in the present day development and activity documentation and information system plays an important role in promoting human welfare and progress in economic, scientific and technological fields as well as in research potential of a country.

Previously even in the advanced countries the mode of communication has been in the form of books and journals. Then came up secondary information services such as abstracting journals, reviews etc. In the mid-twentieth century Documentation and Information activities came under the influence of high speed digital computers and other mechanical processing equipment. KWIC (Key-Word-In-Context), KWOC (Key-Word-Out of-Context) Citation index, etc. are the outcome of these phenomena. In the modern times Information Service falls into two categories : national and international. Under the first category there are Chemical Abstracts, Engineering Index, Institution of Scientific Information Tapes, etc. The second category includes International Nuclear Information System (INIS), International Information System for the Agricultural Science and Technology (AGRIS), Development Science Information Systems (DEVSIIS), etc.

Besides, information systems of various governments for purposes of defence and economic growth have also been recognized. Finally we see the advent of UNISIST, which is based on a joint study of UNESCO and ICSU (International Council of Scientific Union) and has influenced the information activities in various countries.

With the advent of information revolution there is growing awareness of information activities like information acquisition, information storage, information retrieval and dissemination of information contained in a variety of documents. There is however, lack of adequately prepared information systems, information manpower and lack of agreement on what constitutes the information networking.

With the growing awareness of the activities of information science all over the world, it is realized that proper planning and development of capability in information handling and dissemination help in decision making, advancement of knowledge, eliminating duplication of efforts and so on. It is also felt that in the present day world no nation can prosper without getting highgrade information networks. Developing countries of the world need proper planning in establishing information network which is the prerequisite for socio-economic development by making full use of scientific and technological knowledge.

In contrast to the agreement on the importance of information service, one is struck by the diversity of viewpoints on what constitutes an effective information system. There is a viewpoint prevalent in both industrialized and information - advanced countries that information system can be planned and organized on decentralized as well as on centralized pattern. While Soviet Union has adopted a centralized information system, U K and U S A has more or less a decentralized pattern. India as a developing country started on a decentralized pattern in documentation activities followed by a centralized pattern in NISSAT programme launched under the Department of Science and Technology.

Thus there has been some ambiguity and variance in deciding a pattern of information activities for Bangladesh. An intensive survey was therefore made of the existing situation in the country followed by an analysis of different patterns existing in certain leading nations in the world so that an effective design could be worked out for Bangladesh.

In Bangladesh, libraries and information centres have sprung up in a piece-meal way, without liaison, planning and coordination. The National Science library

of Bangladesh established recently under the control of National Council of Science and Technology (NCST), Bangladesh, is yet to be adequately developed. It may be mentioned here that Bangladesh Education Commission which was formed by the Government order in 1974, recommended that Bangladesh Central Public Library, Dhaka should be turned into the proposed National Library for the country. Later on the project was revised and further steps taken which have been included in the 2nd Five Year Plan (1980-85) for the establishment of the National Library of Bangladesh located at Sher-e-Banglanagar, Dhaka. The total cost of the project would be Taka 465.18 lakhs (US \$ 3,101,200 approximately). Bangladesh has already suffered a great deal due to the absence of having a National Library since the very beginning of 1947.

Simultaneously, copyright deposit legislation should be enacted which like the proposed national library, should make provision for the compilation and publication of a National Bibliography. It may be mentioned, that during Pakistani time, Pakistan Bibliographical Working Group was set up at Karachi with the assistance of Unesco. Now Bangladesh being a separate sovereign State, it is to be hoped that a similar organization for the National Biblio-

graphy should be established immediately on the same lines as suggested in the Education Commission report in regard to the establishment of Scientific Documentation Centre in Bangladesh after its liberation. Public Library system is not adequate in Bangladesh though there are 3 Government Public Libraries and 115 non-Government Public Libraries at present.

In organizing a network of documentation and information activities public library system and academic library system have to be brought within the structure. Network should be established among each pattern of library activities. It has already been stated that there are at present 100 special libraries attached to various governmental and semi-governmental departments, learned societies, research institutions and industrial establishments. The special libraries may be stated to be better developed than others.

National Documentation Centres for Science and technology and other Documentation Centres like Documentation Centre of BARC, Documentation Centre of National Medical Library, Documentation Centre of BIDS, Dhaka. All these centres should be adequately developed.

However, it has been observed that the concept of information and particularly of systematically organized technological information has not yet clearly made its entry in Bangladesh as a major objectives and still plays a minor role in the general flow of communication. Potential users are, therefore, not yet very accustomed to technical reading matter. The Department of Science and Technology under NCST, Govt. of Bangladesh has taken step to establish an agency of Information Documentation and International Cooperation Wing (diagram is shown in Appendix- L). Proposal has been made to the effect that this newly documentation information centre may act as a coordinating agency to interlink the existing and future information sources, systems or networks in the field of scientific and technological information into an effective network.

A humble beginning in this proposal can be made in Bangladesh by creating operating Centre (mentioned in the proposal) for the entire literature holdings of about 100 special libraries of the state. A provision may also be made that the Central body will also act in close cooperation with national and international information agencies such as NISSAT, VINITY, INIST, AGRIS etc.

Bangladesh has to embark without delay on an innovative programme to develop a nation-wide system of information

services for bringing problem solving knowledge to bear on country's socio-economic development, and to project this system as a design suitable to the cultural, social and economic needs of the country. The key implication of the research work has been to examine the existing patterns, draw a trend and suggest the thrusts in information activities. The country having come into existence only in 1971, it has to identify the thrust concerning the preparation of an information system in the shortest possible time. Another thrust has its objective in the formulation and institutionalisation of a design taking into consideration the country's structure of higher learning, research and economy. A review of the patterns in three developed countries and one developing country helped in examining the trend in information activities, proposing to augment or redesign the existing pattern for Bangladesh or to work out a new design for the country.

It must be concluded that the information system designed for Bangladesh would enable the nation to achieve an effective and coordinated results in the shortest possible time.

However, the success of the project undoubtedly depends mainly on the support, enthusiasm and cooperating of all the professionals serving in the participating libraries of the project and the Government's and non-Government agencies responsible for the running of various scientific and special libraries and Documentation Centres exist in Bangladesh.

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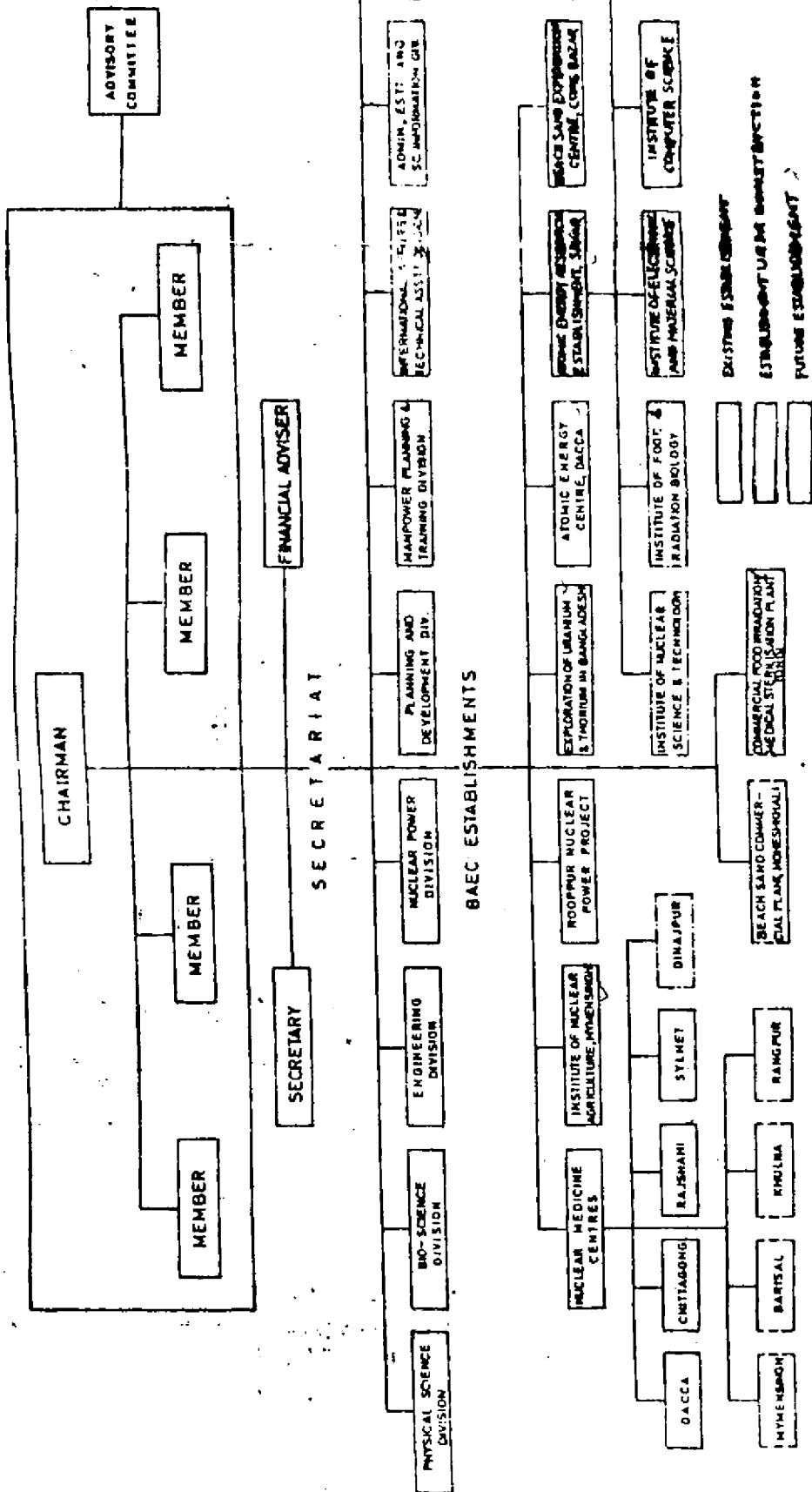
10.3 SECTORAL ALLOCATION OF GOVT INVESTMENT AND DEVELOPMENT EXPENDITURE
year plan (1980-85) at 1979-80 Prices

(Taka in crores)

Sector	Total	Financial Development Outlay				Non-monitized investment	
		%	Public	%	Private	%	
1. Agriculture and related activities	6600	29.87	5200	33.36	1300	20.93	550
(a) Agriculture	2900	13.12	2400	15.11	500	8.05	
i) Crop and foodgrain storage			1730				
ii) Livestock			155				
iii) Forestry			255				
iv) Fisheries			260				
(b) Irrigation and water resources	3100	14.03	2300	14.48	800	12.88	
(c) Rural Dev. and Institutions	600	2.72	600	2.78	—	—	80
2. Industry	3845	17.40	2345	14.76	1500	24.16	
3. Power and natural resources	2650	11.99	2650	16.68	—	—	20
4. Physical Planning and Housing	2225	10.07	900	5.66	13.25	21.34	720
5. Transport	2918	13.21	1833	11.54	1085	17.47	100
6. Communication	500	2.26	500	3.15	—	—	—
7. Socio-economic infrastructure	1160	5.25	1134	7.14	26	0.42	30
(a) Health			481	3.03	26		
(b) Pop. Control and family planning			532	3.35			
(c) Social welfare			57	0.36			
(d) Sports and culture			64	0.40			
8. Human resources development	1253	5.67	1225	7.71	28	0.45	100
(a) Education			775	4.88	28		
(b) Manpower and training			118	0.74			
(c) STR			155	0.98			
(d) Youth development			75	0.47			
(e) Women's affairs			52	0.33			
(f) Religious affairs			11	0.07			
(g) Public administration			39	0.24			
9. Trade and other services	946	4.28	—	—	946	15.23	100
Total	22,097	100.00	15,887	100.00	6,210	100.00	1,700

Source: Planning Commission *Revised data as of December, 1981.

BANGLADESH ATOMIC ENERGY COMMISSION
ORGANISATION CHART



APPENDIX-DTELESCOPIC RISE IN COST OF PERIODICALS

Name of Journal	Price in		
	Year of inception	1975	1981
Analyt Biochem	\$ 15.0	\$ 258.0	\$ 682.0
Biochem Pharmacol(1958)	\$ 60.0	\$ 175.0	\$ 475.0
Carbohydrate Res(1965)	Dfl 63.0	Dfl 721.0	Dfl 1452.0
Eur J Pharmacol (1967)	" 61.0	" 392.0	" 1474.0
FEBS Lett(1968)	" 110.0	" 880.0	" 2072.0
J Chromatogr (1958)	" 57.0	" 1485.0	" 3672.0
J Physiol, Lond (1878)	£ 4.0	£ 100.0	£ 300.0

(Price in 1960)

J Theoret Biol(1961)	£ 17.50	£ 127.50	£ 358.50
Molec Cell Biochem (1973)	Dfl 186.0	Dfl 440.0	Dfl 1368.0
Tetrahedron (1957)	\$ 70.0	\$ 280.0	\$ 660.0
Tetrahedron Lett(1959)	\$ 30.0	\$ 220.0	\$ 616.0
Virology (1955)	\$ 22.0	\$ 210.50	\$ 542.0

Secondary
Periodicals

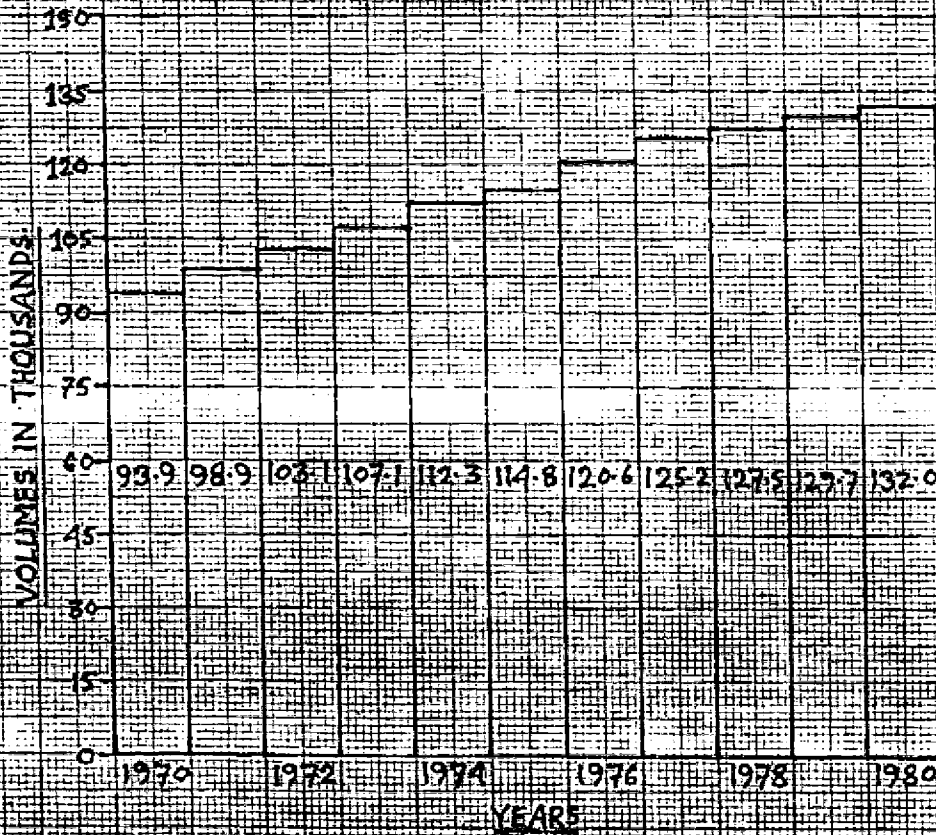
Biol Abstr (1926)	\$ 170.0	\$ 1420.0	\$ 3520.0
Chem Abstr (1907)	\$ 925.0	\$ 2945.0	\$ 5632.0
Cur Abstr Chem Lit (Index Chem)(1960)	\$ 800.0	\$ 1400.0	\$ 2200.0
Phys Abstr (See A of Sci Abstr)1898	£ 10.0	£ 165.0	£ 565.0

Source : International Information Communication and Education(INICAE)
V 1, N 2, Sept.1982, p 188.

APPROXIMATE

GROWTH OF DEFENCE SCIENCE LIBRARY (INDIA)

SCALE: 1 CM = 15 THOUSANDS



SDOC

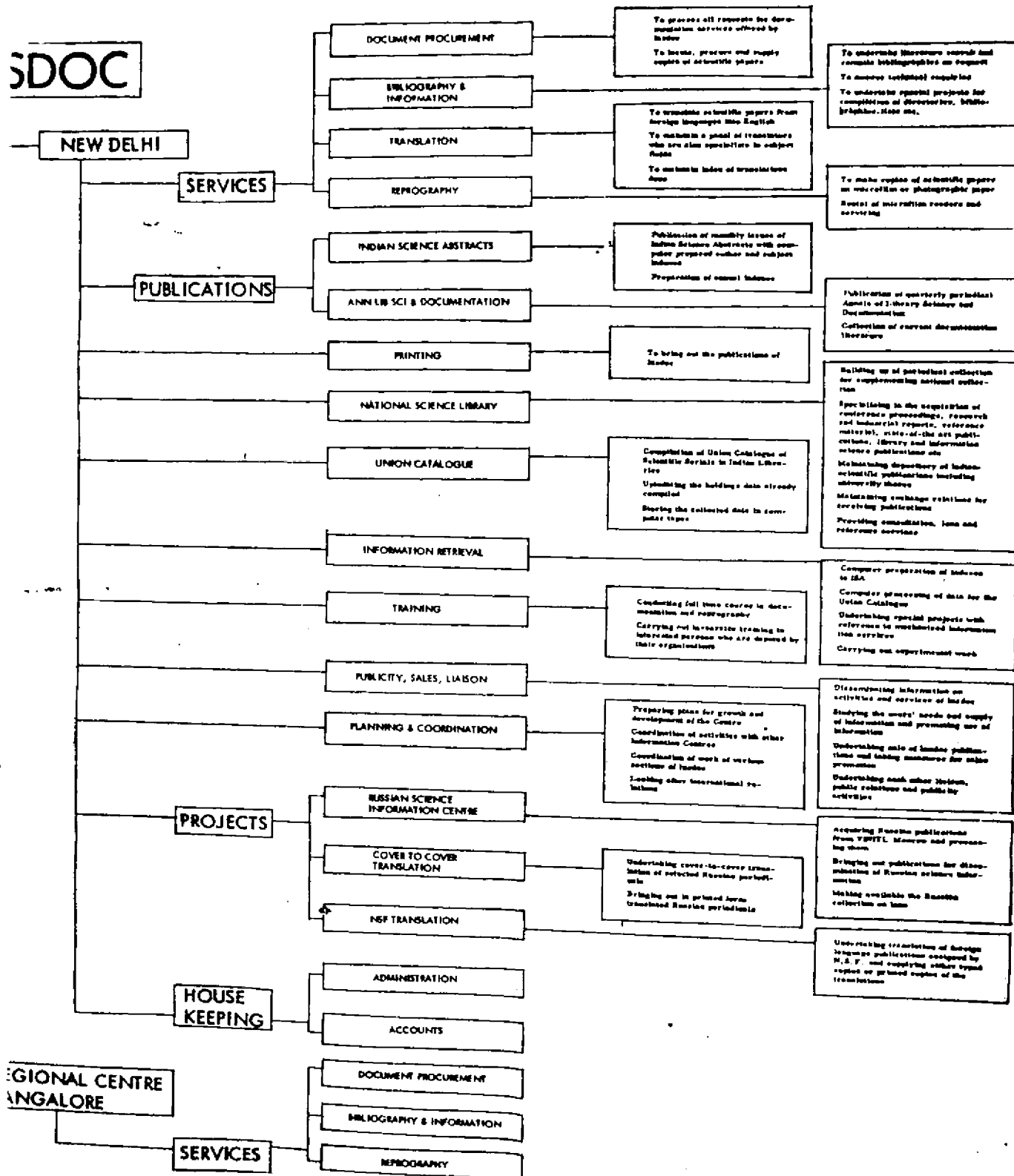
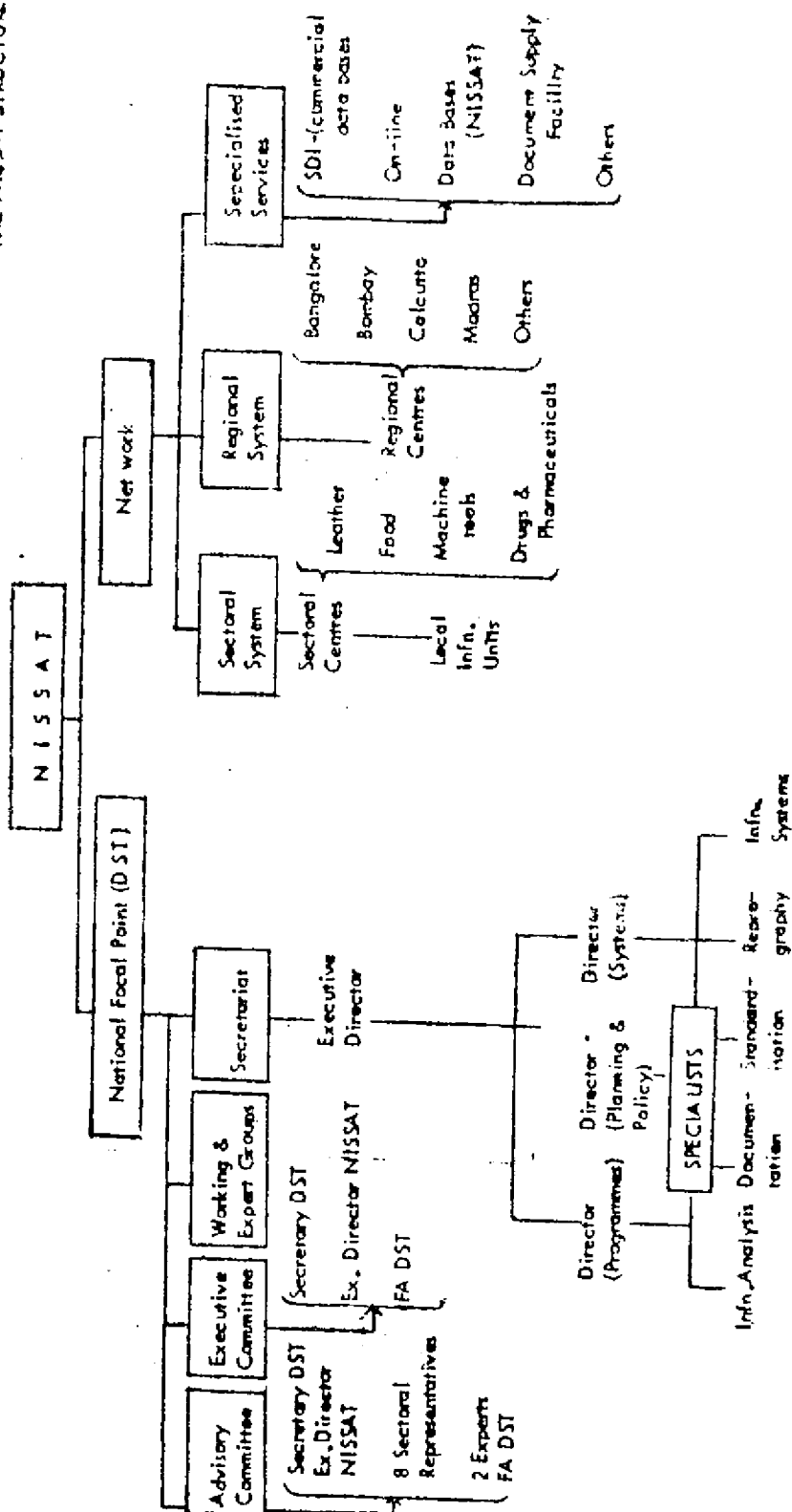


Fig. 1

THE NISSAT STRUCTURE



APPENDIX - A H

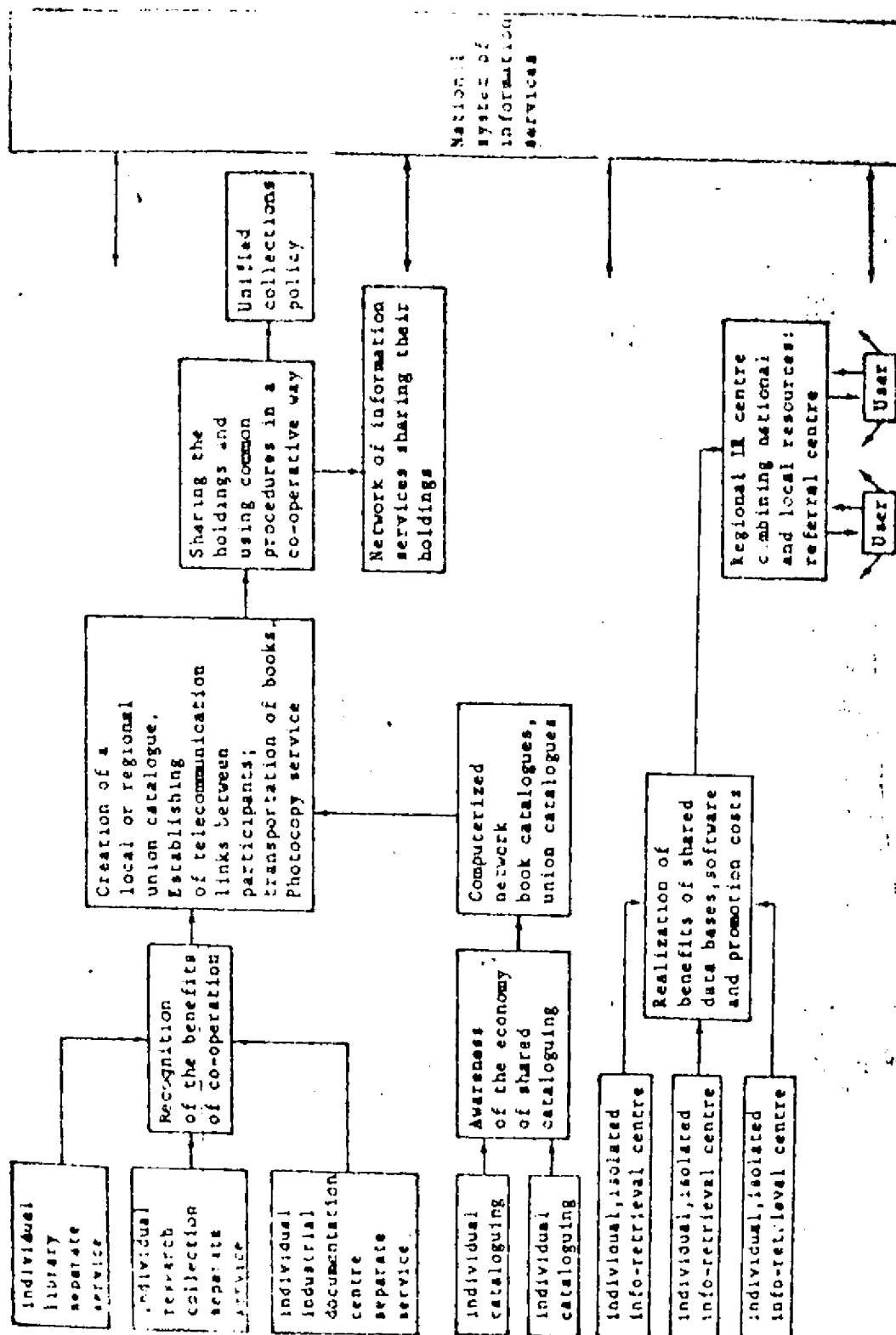


Figure 1-1 The way information systems might evolve and transmit into networks

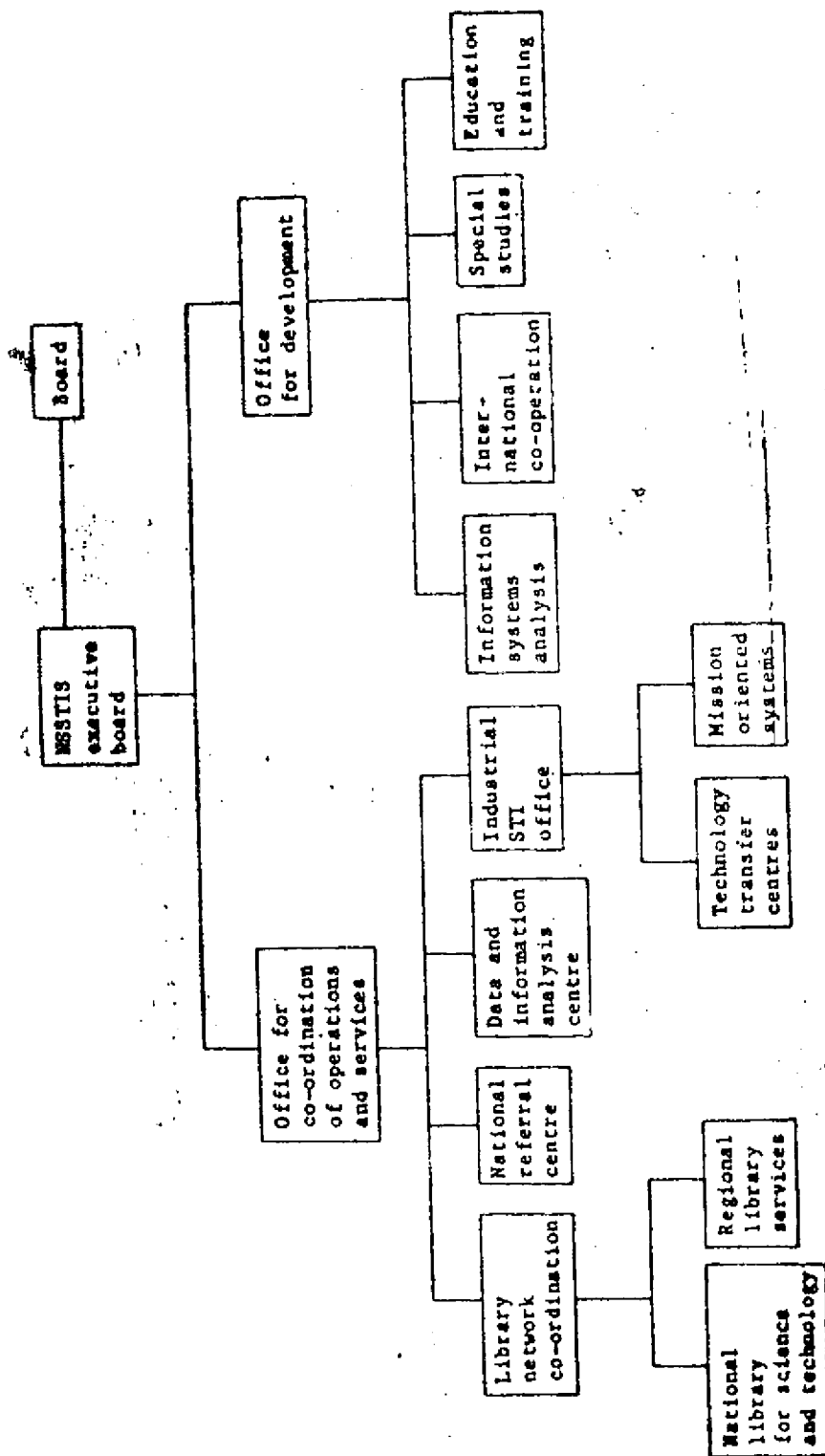
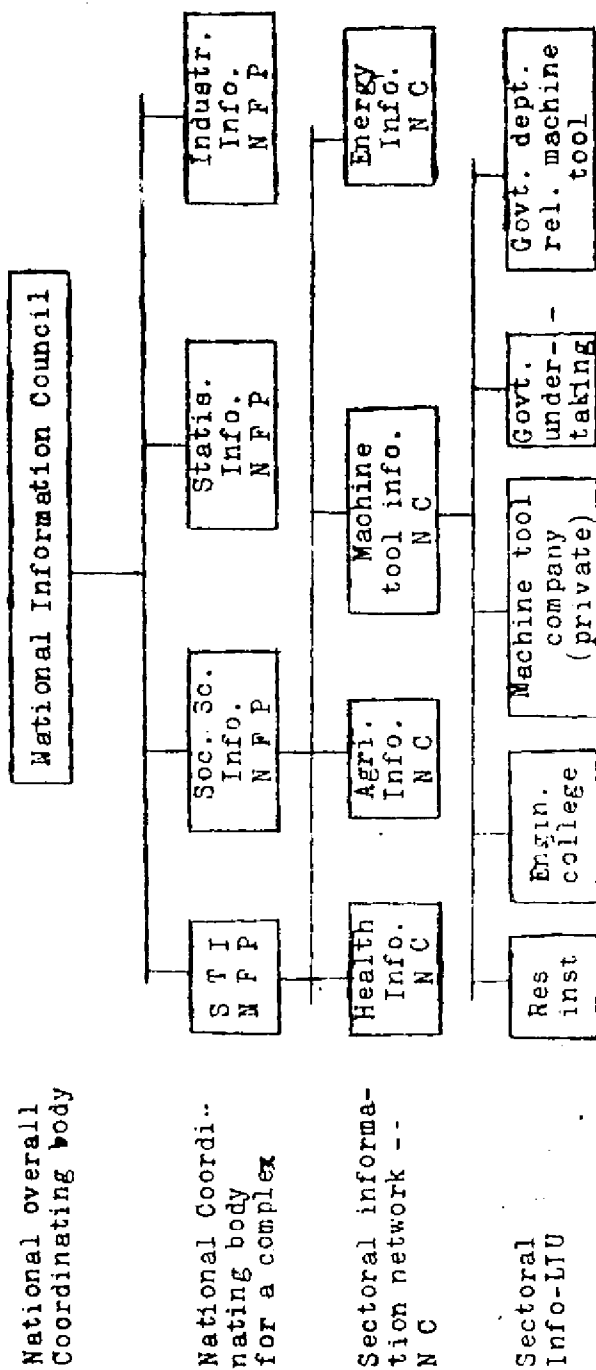


Figure 1.8. Organizational links for a national system of scientific and technical information services (NSTIS)

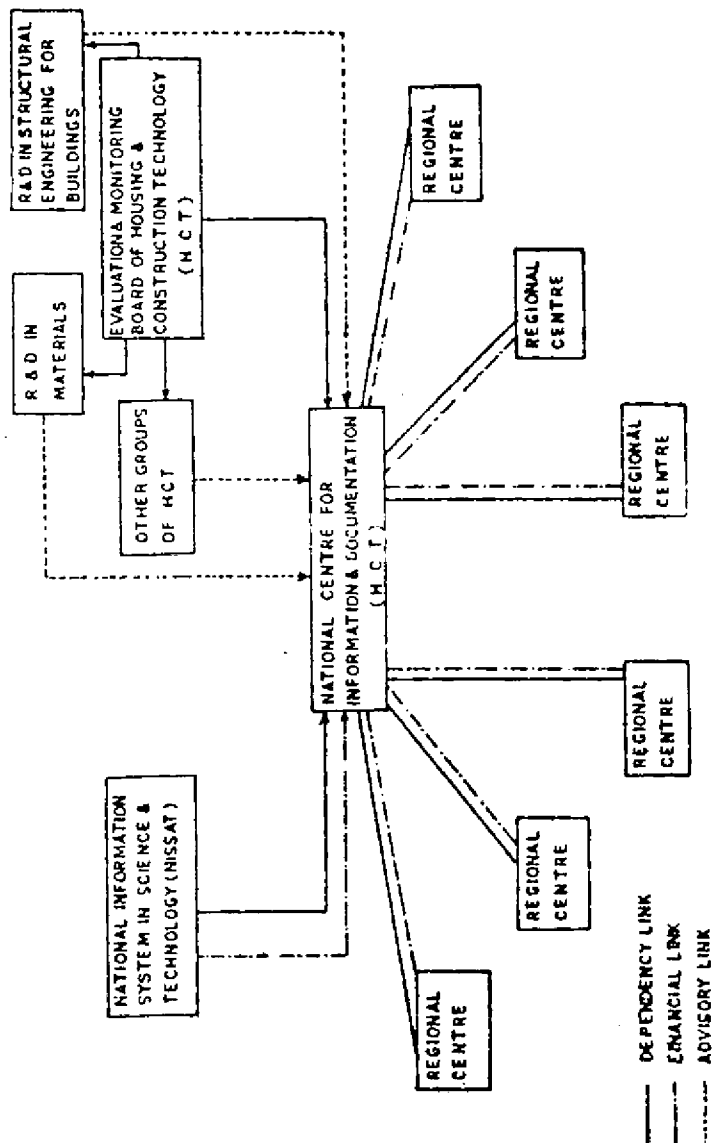
APPENDIX - C 23.

NATIONAL INFORMATION SYSTEM STRUCTURE (Simplified Model)

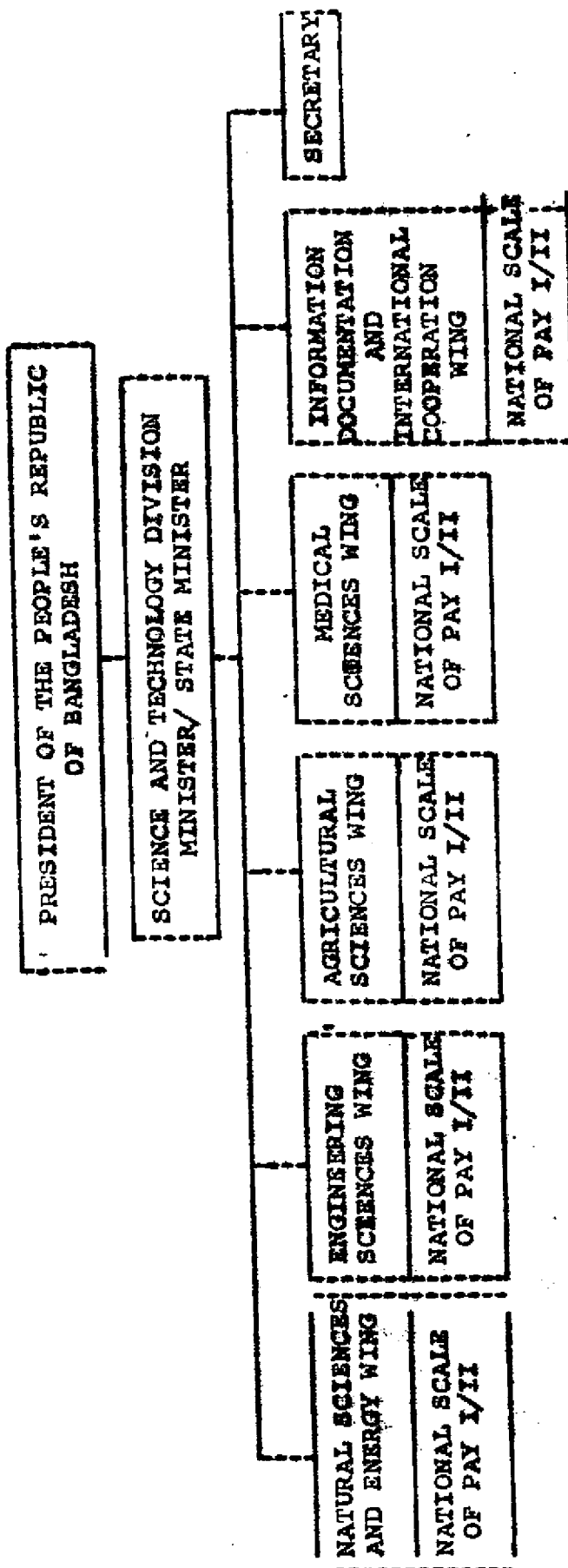


APPENDIX 1

SCHEMATIC DIAGRAM SHOWING THE ENTIRE INFORMATION SYSTEM



NEWLY PROPOSED PLAN OF THE RESEARCH INSTITUTIONS/
ORGANIZATIONS UNDER NCST OF BANGLADESH



APPENDIX-M

SUBJECTWISE DISTRIBUTIONS OF INSTITUTIONS IN BANGLADESH

S.No.	Medical Sciences	Engineering & Technology	Agriculture & Animal Husbandry	Pure Sciences	Documentation Centre
1	2	3	4	5	6
1.	Bangladesh Diabetic Research Institute, Dhaka	Bangladesh Atomic Energy Commission, Dhaka.	Agriculture College, Dhaka	Department of Agriculture University of Mymensingh	Bangladesh National Scientific & Technical Documentation Centre.
2.	Bangladesh Medical Association, Dhaka.	Bangladesh Engineers Institute, Dhaka.	Bangladesh Agricultural Research Council Dhaka	Deptt. Chittagong University, Chittagong	Documentation Centre in Bangladesh Agricultural Research Council. Dhaka.
3.	Bangladesh Nursing Council, Dhaka.	Bangladesh Marine Academy, Chittagong.	Bangladesh Agricultural Research Institute, Dhaka	Deptt. of Dhaka University, Dhaka.	Documentation Centre in Bangladesh Atomic Energy Commission. Dhaka
4.	Barisal Medical College, Barisal.	Bangladesh Mineral Exploration & Dev. Corporation, Dhaka	Bangladesh Council of Scientific and Industrial Research, Dhaka	Jahangir Nagar University, (New Dhaka)	Documentation Centre Bangladesh Bank, Dhaka.
5.	Board of Unani and Ayurvedic System of Medicine, Dhaka	Bangladesh Small Scale Industries Corporation (BSIC) Dhaka	Bangladesh Forest Research Institute, Chittagong.	Deptt. Rajshahi University, Rajshahi.	Documentation Services of ICDDR (International Centre for Diarrhoeal Disease Research Bangladesh, Dhaka.

Appendix contd....

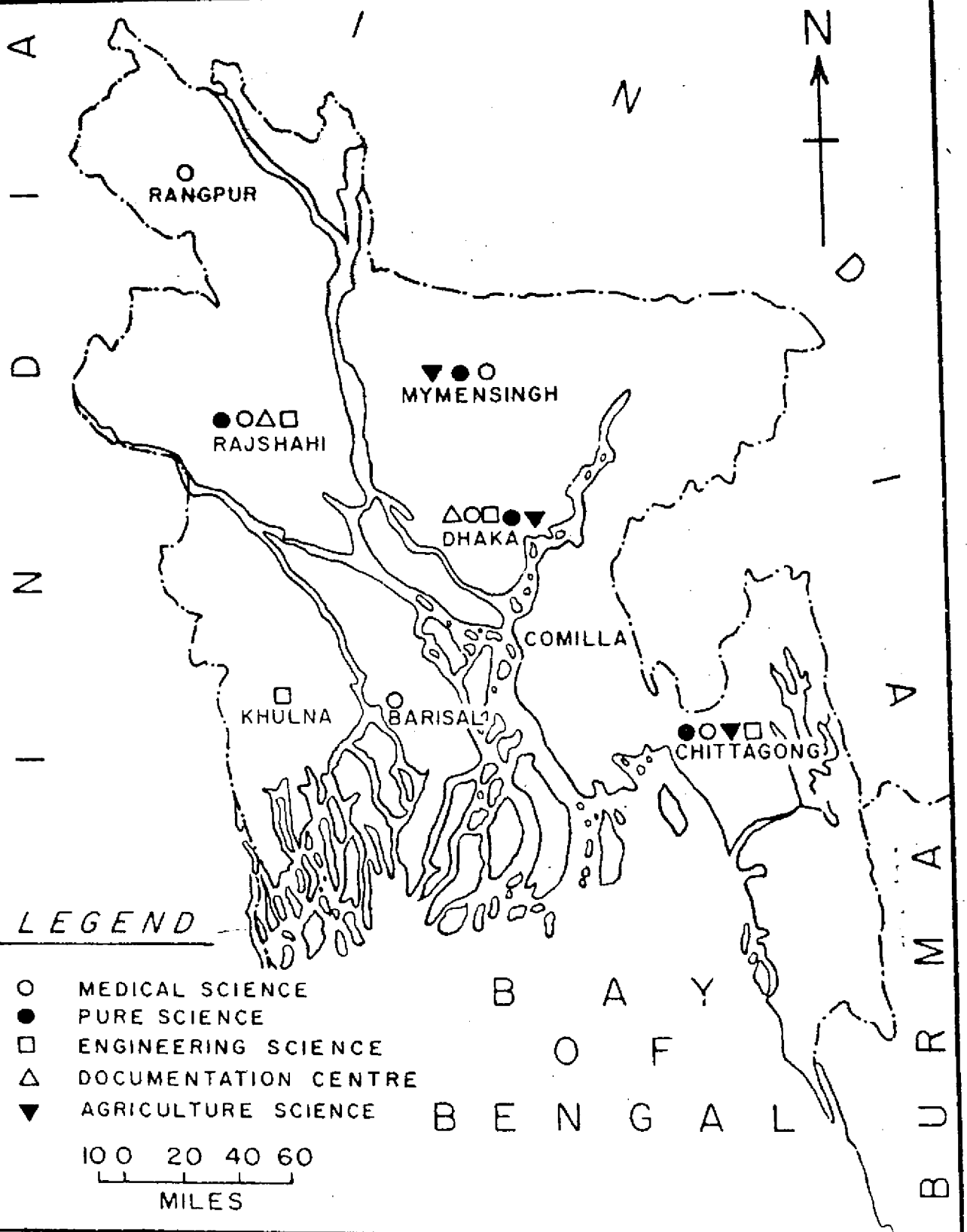
1	2	3	4	5	6
6.	Cancer Research Institute, Dhaka	Bangladesh University of Engineering and Technology, Dhaka	Bangladesh Rice Research Institute, Dhaka	-	Patents Department in Bangladesh, Dhaka
7.	Central Drug Research Laboratory, Dhaka	Building Research Institute, Dhaka	Bangladesh Tea Research Institute, Sylhet.	-	Standard Institution, Bangladesh, Dhaka.
8.	Chittagong Medical College, Chittagong	Chittagong Engineering College, Chittagong	Botanical Garden, Dhaka	-	National Medical Library & Documentation Centre, Dhaka
9.	Dhaka Medical College, Dhaka	Geological Survey of Bangladesh, Dhaka	Department of Botany, Chittagong University, Chittagong	-	Documentation Centre, Bangladesh Institute of Development Studies, Dhaka
10.	Dhaka Dental College, Dhaka	Khulna Engineering College, Khulna	Deptt. of Botany Rajshahi University Rajshahi	-	
11.	Homeopathic Medical College, Dhaka	Leather Technology Institute, Dhaka	Deptt. of Zoology, Chittagong, University, Chittagong	-	
12.	Institute of Diseases of Chest, Dhaka	Marine Diesel Research Institute, Narayanganj	Deptt. of Zoology, Dhaka University, Dhaka	-	

1	2	3	4	5	6
13.	Institute of Post-Graduate Medicine and Research, Dhaka	Petro-Bangla, Dhaka	Deptt. of Zoology Rajshahi University, Rajshahi	-	-
14.	International Centre for Diarrhoeal Disease Research, Dhaka	17 Polytechnic Institute, Bangladesh	Deptt. of Soil Sciences, Dhaka University, Dhaka	-	-
15.	Islamic Eye Hospital, Dhaka	Rajshahi Engineering College Rajshahi	Directorate of Livestock Services, Dhaka	-	-
16.	Mymensingh Medical College, Mymensingh	Sericulture Research Institute, Rajshahi	Fisheries Research Station, Dhaka	-	-
17.	National Institute of Preventive Medicine, Dhaka	Textile Institute, Dhaka	Institute of Nuclear Agriculture, Mymensingh	-	-
18.	National Nutrition Laboratory, Dhaka	23 vocational Training Institute (TTC)	Institute of Nutrition and Food Science, Dhaka	-	-

Appendix concl'd.

1	2	3	4	5	6
19.	Rajshahi Medical College, Rajshahi	-	Jute Research Institute, Dhaka	-	-
20.	Rangpur Medical College, Rangpur	-	Livestock Research Institute, Mohakhali, Dhaka	-	-
21.	Salimullah Medical College, Dhaka	-	Sugarcane Research Institute, Pabna	-	-
22.	Sishu Hospital, Dhaka	-	Tobacco Development Board, Dhaka	-	-
23.	Sylhet Medical College, Dhaka	-	University of Agri- culture, Mymensingh	-	-

BANGLADESH



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